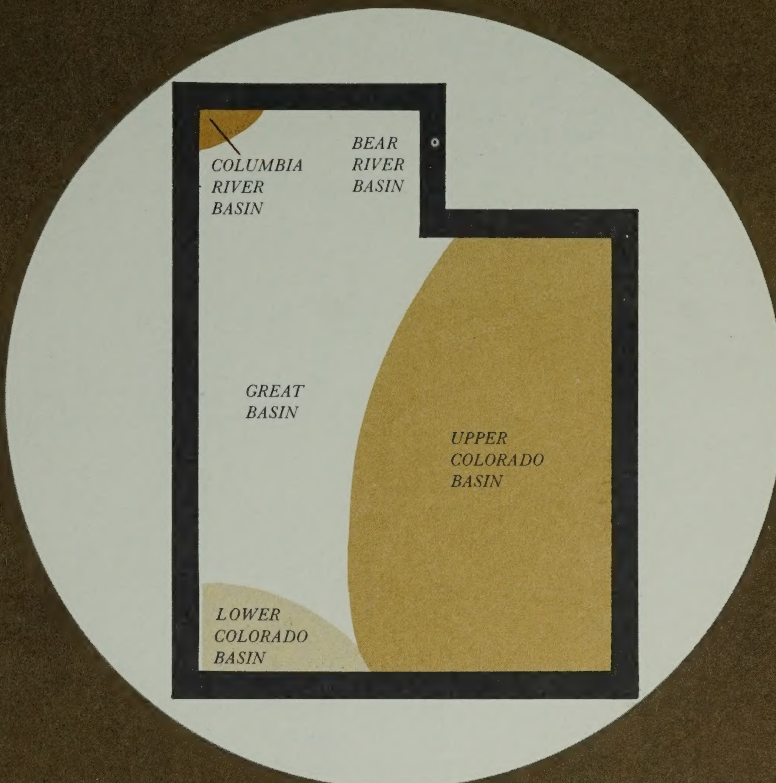

DEVELOPING A STATE WATER PLAN

GROUND WATER CONDITIONS IN UTAH, SPRING OF 1982

COOPERATIVE INVESTIGATIONS REPORT NO 22

UTAH DIVISION OF WATER RESOURCES—U.S. GEOLOGICAL SURVEY

DEVELOPING A STATE WATER PLAN

GROUND-WATER CONDITIONS IN UTAH, SPRING OF 1982

by

W. F. Holmes and others

United States Geological Survey

Prepared by the United States Geological Survey
in cooperation with the State of Utah

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Utah Department of Natural Resources and Energy

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1982

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CONVERSION FACTORS

Most values are given in this report in inch-pound units followed by metric units in parentheses. The conversion factors used are shown to four significant figures. However, in the text, the metric equivalents are shown only to the number of significant figures consistent with the accuracy of the value in inch-pound units.

Inch-pound			Metric	
Unit (multiply)	Abbreviation	(by)	Unit (to obtain)	Abbreviation
Acre-foot	acre-ft	0.001233	Cubic hectometer	hm^3
Foot	ft	0.3048	Meter	m
Inch	in.	25.40	Millimeter	mm
Mile	mi	1.609	Kilometer	km

Chemical concentration is given only in metric units—milligrams per liter (mg/L). For concentrations less than 7,000 mg/L, the numerical value is about the same as for concentrations in parts per million.

GROUND-WATER CONDITIONS IN UTAH, SPRING OF 1982

by

W. F. Holmes and others
U.S. Geological Survey

INTRODUCTION

This is the nineteenth in a series of annual reports that describe ground-water conditions in Utah. Reports in the series, prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources, provide data to enable interested parties to keep abreast of changing ground-water conditions.

This report, like the others in the series, contains information on well construction, ground-water withdrawals, water-level changes, and related changes in precipitation and streamflow. Supplementary data such as graphs showing chemical quality of water and maps showing ground-water level contours are included in reports of this series only for those years or areas for which applicable data are available and are important to a discussion of changing ground-water conditions.

The report includes individual discussions of selected major areas of ground-water development in the State for the calendar year 1981. Water-level fluctuations, however, are described for the period spring 1981 to spring 1982. Much of the data used in the report were collected by the Geological Survey in cooperation with the Division of Water Rights, Utah Department of Natural Resources.

The following reports dealing with ground water in the State were released by the Geological Survey during 1981:

Contours of the base of the Quaternary deposits in the Jordan Valley, Utah, by Ted Arnow, *in* Ground-water quality management (background report): Salt Lake County Division of Water Quality and Water Pollution Control duplicated report.

Digital-computer model of the principal ground-water reservoir in Beryl-Enterprise area, Escalante Desert, Utah, by R. W. Mower and S. D. Bartholoma, U.S. Geological Survey Open-File Report 81-532.

Favorable environments for the occurrence of sandstone-type uranium deposits, Milford Basin, Utah, by W. R. Miller and J. B. McHugh, U.S. Geological Survey Open-File Report 81-501.

Ground-water data for the Beryl-Enterprise area, Escalante Desert, Utah, by R. W. Mower, U.S. Geological Survey Open-File Report 81-340 (also duplicated as Utah Hydrologic-Data Report 35).

Ground-water resources of the central Wasatch Front area, Utah, by Don Price, Utah Geological and Mineral Survey Wasatch Front Environment and Resource Map 54-D (in press).

Hydrology of the Beryl-Enterprise area, Escalante Desert, Utah, with emphasis on ground water, by R. W. Mower, U.S. Geological Survey Open-File Report 81-533 (pending publication as Utah Department of Natural Resources Technical Publication 73).

Hydrology of the coal-resource areas in the upper drainages of Huntington and Cottonwood Creeks, central Utah, by T. W. Danielson, M. D. ReMillard, and R. H. Fuller, U.S. Geological Survey Water-Resources Investigations Open-File Report 81-539.

Hydrology of the Ferron Sandstone aquifer and effects of proposed surface-coal mining in Castle Valley, Utah, by Gregory C. Lines and Daniel J. Morrissey, U.S. Geological Open-File Report 81-535 (pending publication as U.S. Geological Survey Water-Supply Paper 2195).

Hydrologic monitoring in the coal fields of central Utah, August 1978-September 1979, by Gregory C. Lines and Gerald G. Plantz, U.S. Geological Survey Water-Resources Investigations Open-File Report 80-138.

Map showing general availability of ground water in the Alton-Kolob coal-fields area, Utah, by Don Price, U.S. Geological Survey Miscellaneous Investigations Map I-1235-C.

Map showing general chemical quality of ground water in the Alton-Kolob coal-fields area, Utah, by Don Price, U.S. Geological Survey Miscellaneous Investigations Map I-1235-B.

Map showing general chemical quality of ground water in the Richfield Quadrangle, Utah, by Don Price, U.S. Geological Survey Miscellaneous Investigations Map I-1374.

Preliminary hydrologic evaluation of the North Horn Mountain coal-resource area, Utah, by M. J. Graham, J. E. Tooley, and Don Price, U.S. Geological Survey Open-File Report 81-141.

Test drilling for freshwater in Tooele Valley, Utah, by K. H. Ryan, B. W. Nance, and A. C. Razem, Utah Department of Natural Resources, Division of Water Rights Information Bulletin 26.

UTAH'S GROUND-WATER RESERVOIRS

Small quantities of ground water can be obtained from wells throughout much of Utah, but large supplies that are of suitable chemical quality for irrigation, public supply, or industrial use generally can be obtained only in specific areas. The major areas of ground-water development discussed in this report are shown in figure 1 and named in table 1. Only a few wells outside of these areas yield large supplies of water of good chemical quality for the uses listed above, although some of the basins in western Utah and many areas in eastern Utah have not been explored sufficiently to determine their potential for ground-water development.

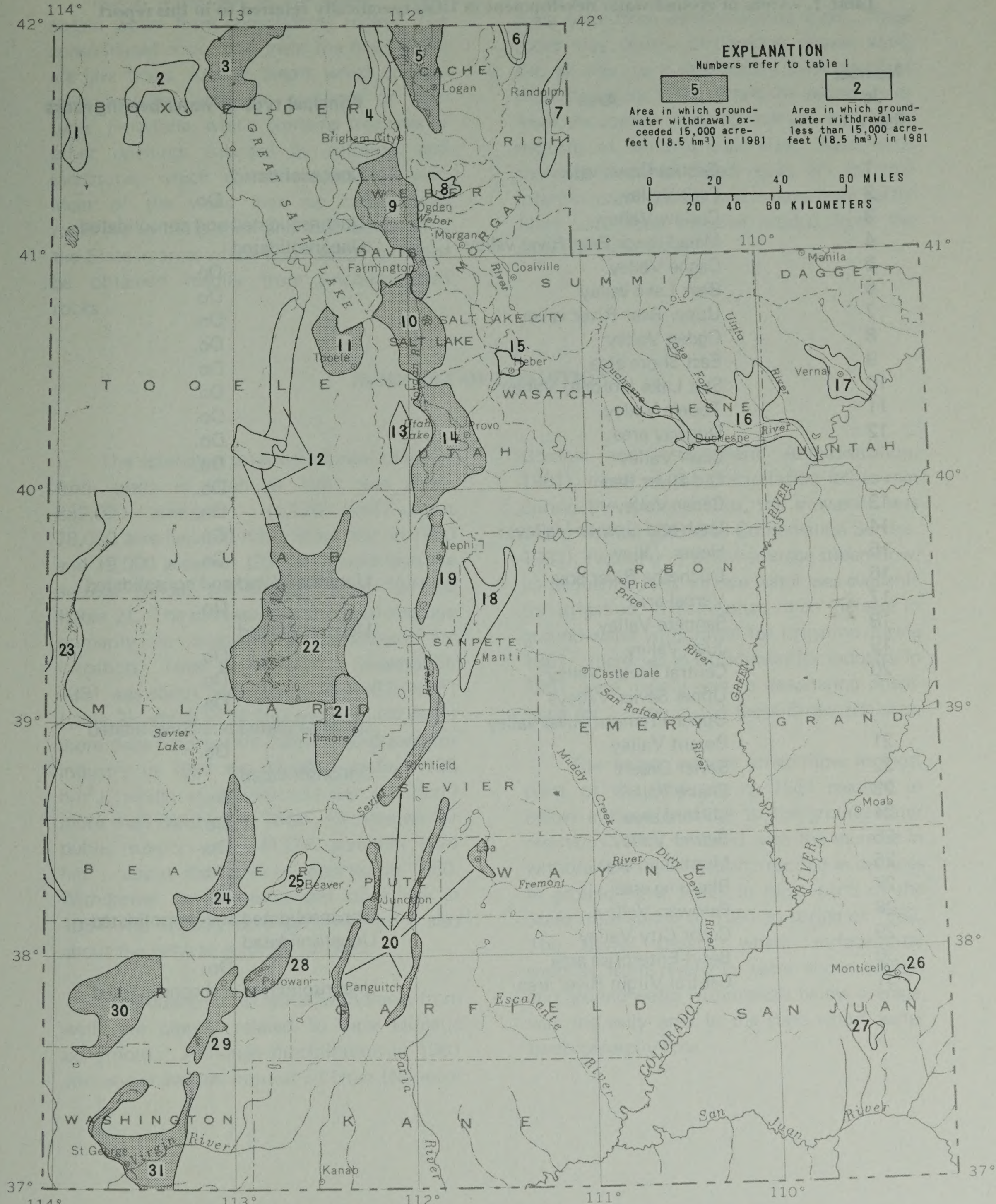


Figure 1.—Areas of ground-water development specifically referred to in this report.

Table 1.—Areas of ground-water development in Utah specifically referred to in this report

Number in figure 1	Area	Principal type of water-bearing rocks
1	Grouse Creek valley	Unconsolidated
2	Park Valley	Do.
3	Curlew Valley	Unconsolidated and consolidated
4	Malad-lower Bear River valley	Unconsolidated
5	Cache Valley	Do.
6	Bear Lake valley	Do.
7	Upper Bear River valley	Do.
8	Ogden Valley	Do.
9	East Shore area	Do.
10	Salt Lake (Jordan) Valley	Do.
11	Tooele Valley	Do.
12	Dugway area	Do.
	Skull Valley	Do.
	Old River Bed	Do.
13	Cedar Valley	Do.
14	Utah and Goshen Valleys	Do.
15	Heber Valley	Do.
16	Duchesne River area	Unconsolidated and consolidated
17	Vernal area	Do.
18	Sanpete Valley	Unconsolidated
19	Juab Valley	Do.
20	Central Sevier Valley	Do.
	Upper Sevier Valleys	Do.
	Upper Fremont River valley	Unconsolidated and consolidated
21	Pavant Valley	Do.
22	Sevier Desert	Unconsolidated
23	Snake Valley	Do.
24	Milford area	Do.
25	Beaver Valley	Do.
26	Monticello area	Do.
27	Blanding area	Do.
28	Parowan Valley	Unconsolidated and consolidated
29	Cedar City Valley	Unconsolidated
30	Beryl-Enterprise area	Do.
31	Central Virgin River area	Unconsolidated and consolidated

About 2 percent of the wells in Utah obtain water from consolidated rocks. The consolidated rocks that yield the most water are lava flows, such as basalt, which contain interconnected vesicular openings or fractures; limestone, which contains fractures or other openings enlarged by solution; and sandstone, which contains open fractures. Most of the wells that tap consolidated rocks are in the eastern and southern parts of the State in areas where water supplies cannot be obtained readily from unconsolidated rocks.

About 98 percent of the wells in Utah draw water from unconsolidated rocks. These rocks may consist of boulders, gravel, sand, silt, or clay, or a mixture of some or all of these materials. Wells obtain the largest yields from the coarser materials that are sorted into deposits of uniform grain size. Most wells that tap unconsolidated rocks are in large intermountain basins, which have been partly filled with rock material eroded from the adjacent mountains.

SUMMARY OF CONDITIONS

The estimated total withdrawal of water from wells in Utah in 1981 was about 832,000 acre-feet (1,026 hm^3)—about 78,000 acre-feet (96 hm^3) more than in 1980 and 19,000 acre-feet (23 hm^3) more than the average annual withdrawal during 1971-80 (table 2). The increase in withdrawal was due primarily to increases in withdrawal for irrigation. Total withdrawal for irrigation in 1981 was about 548,000 acre-feet (676 hm^3) (table 2), which is 54,000 acre-feet (67 hm^3) more than reported for 1980. Withdrawal for industry in 1981 was 85,000 acre-feet (105 hm^3), which is 20,000 acre-feet (25 hm^3) more than reported in 1980. Withdrawal for public supply was 141,000 acre-feet (174 hm^3), about the same as reported in 1980. Withdrawal for domestic and stock use in 1981 was 60,000 acre-feet (74 hm^3), also about the same as reported in 1980.

The quantities of water withdrawn from wells are closely related to local climatic conditions. Although precipitation in 1981 was above average in most of Utah (National Oceanic and Atmospheric Administration, 1981), much of the precipitation fell as rain during the spring. Thus, the snowpack was below normal (U.S. Soil Conservation Service, 1981), resulting in below average streamflow; consequently, less surface water was available for irrigation. This resulted in an increase in ground-water withdrawal for irrigation during 1981. Increases in withdrawal for industry in 1981 were mainly due to dewatering operations for a mine in the Beryl-Enterprise area.

The below average streamflow in most parts of the State during 1981 resulted in below average recharge to the ground-water reservoirs. This, coupled with the increase in withdrawals for irrigation, resulted in declines in ground-water levels in most parts of the State from spring of 1981 to spring of 1982. The Sevier Desert, where surface-water supplies from reservoirs were above average and ground-water withdrawals below average, was the only area in the state where water levels generally rose.

Table 2.—Well construction and withdrawal of water from wells in Utah

Area	Number in figure 1	Number of wells completed in 1981[1]: Total	Number of wells completed in 1981[1]: 6 inches or more[2]	Estimated withdrawal from wells (acre-feet), 1981: Irrigation	1981: Industry	1981: Public supply	1981: Domestic and stock	1981: Total (rounded)	1980 total[3]	1971-80 average annual[4]
Curlew Valley[5]	3	4	1	40,000	0	60	50	40,000	30,000	24,000
Cache Valley	5	31	3	16,400	[6]9,200	5,200	2,100	33,000	25,000	26,000
East Shore area	9	21	2	[7]8,600	6,300	21,000	–	36,000	45,000	42,000
Salt Lake (Jordan) Valley	10	38	9	2,400	[8]32,700	59,200	[6]31,000	125,000	128,000	126,000
Tooele Valley	11	15	3	[7]23,200	500	6,100	150	30,000	27,000	29,000
Utah and Goshen Valleys	14	58	2	56,100	11,000	21,500	[9]12,800	101,000	94,000	100,000
Juab Valley	19	8	1	20,300	50	750	200	21,000	15,000	24,000
Sevier Desert	22	40	2	14,000	1,300	800	1,700	18,000	13,000	31,000
Upper and central Sevier Valleys and upper Fremont River valley[10]	20	31	0	15,000	150	3,900	6,300	25,000	24,000	23,000
Pavant Valley	21	2	0	79,000	100	150	300	80,000	75,000	91,000
Cedar City Valley	29	4	0	[11]23,900	900	3,900	400	29,000	28,000	34,000
Parowan Valley	28	1	0	[11 12]26,100	300	400	200	27,000	28,000	29,000
Escalante Valley										
Milford area	24	2	0	68,000	0	1,000	300	69,000	61,000	60,000
Beryl-Enterprise area	30	5	4	[11]75,100	16,800	370	750	93,000	71,000	78,000
Other areas[5 13 14]		314	57	79,700	5,600	16,300	3,400	105,000	90,000	96,000
Totals (rounded)		574	84	548,000	85,000	141,000	60,000	832,000	754,000	813,000

[1] Compiled from data supplied by Utah Department of Natural Resources, Division of Water Rights. Includes deepened and replacement wells.
[2] Constructed for irrigation, industry, or public supply.
[3] From Herbert and others (1981, table 2). Some figures include unpublished revisions.
[4] Calculated from previous reports of this series. Some figures include unpublished revisions.
[5] Curlew Valley included under "Other areas" prior to 1982.
[6] Includes some use for fish and fur culture.
[7] Includes some domestic and stock use.
[8] Includes some use for air conditioning.
[9] Includes some use for irrigation.
[10] Upper Fremont River valley included in "Other areas" prior to 1976.
[11] Data from reports of local water commissioners to the Utah Department of Natural Resources, Division of Water Rights.
[12] Includes some use for stock.
[13] Withdrawals are estimated minimum amounts.
[14] Sanpete Valley included under "Other areas" after 1981.

The total number of wells drilled during 1981 (table 2), as indicated by well-drillers' reports filed with the Utah Division of Water Rights, was about 39 percent less than reported for 1980. The number of those wells constructed for public supply, irrigation, and industrial use was about 14 percent less than reported for 1980.

The larger ground-water basins and those containing most of the ground-water development in Utah are shown in figure 1. Table 2 gives information about the number of wells constructed, withdrawals of water from wells for principal uses, and total withdrawals in 1981 for selected major ground-water basins. For comparison, total withdrawals in 1980 and average annual withdrawals during the 10-year period 1971-80 also are shown in table 2. Table 3 shows the annual withdrawals from the major basins for 1971-80.

Table 3.–Total annual withdrawal of water from wells in major areas of ground-water development in Utah, 1971-80
[From previous reports in this series.]

Area	Number in figure 1	Thousands of acre-feet									
		1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Curlew Valley[1]	3	18	20	19	22	21	27	31	27	29	30
Cache Valley	5	24	23	24	24	25	27	32	26	28	25
East Shore area[2]	9	40	40	41	47	38	37	48	36	46	45
Salt Lake (Jordan) Valley	10	116	124	129	130	122	124	119	127	136	128
Tooele Valley	11	24	29	29	33	29	30	28	30	30	27
Utah and Goshen Valleys[2]	14	86	91	89	106	98	107	118	104	107	94
Juab Valley	19	21	30	17	31	25	29	29	19	21	15
Sevier Desert[2]	22	14	38	20	26	26	34	50	40	45	13
Upper and central Sevier Valleys and upper Fremont River valley	20	19	19	19	20	24	25	26	26	24	24
Pavant Valley	21	79	99	69	101	98	95	117	88	86	75
Cedar City Valley	29	36	35	27	42	28	37	40	31	32	28
Parowan Valley	28	24	28	26	31	28	34	33	29	30	28
Escalante Valley											
Milford area	24	58	59	52	70	60	65	65	58	49	61
Beryl-Enterprise area	30	75	77	74	93	85	79	81	71	79	71
Other areas[1]		73	80	76	101	79	106	126	112	112	90
Totals		707	792	711	877	786	856	943	824	854	754

[1] Annual values revised to reflect changes in reporting in 1982 (see footnotes 5 and 14 in table 2).

[2] Annual values revised for this report to reflect more accurate methodology used in determining the amount of water withdrawn from wells.

CURLEW VALLEY

by L. R. Herbert

Withdrawal of water from wells in Curlew Valley in 1981 was about 40,000 acre-feet (49 hm^3), an increase of 10,000 acre-feet (12 hm^3) from the amount reported in 1980 and 16,000 acre-feet (20 hm^3) more than the 1971-80 average annual withdrawal (table 2). The increase was due to increased withdrawal for irrigation.

Water levels in Curlew Valley generally declined from March 1981 to March 1982 (fig. 2) due to increased withdrawals for irrigation. A small rise of less than 3 feet (0.9 m) near Snowville probably was due to increased local recharge from streamflow.

The relation of water levels in two selected wells to cumulative departure from average annual precipitation at Snowville and annual withdrawal from wells is shown in figure 3. Water levels, as shown by hydrographs, generally have declined since 1965 due to increased withdrawals from wells. Precipitation at Snowville in 1981 was 13.7 inches (348 mm), 1.59 inches (40.4 mm) above the 1941-81 average annual precipitation.

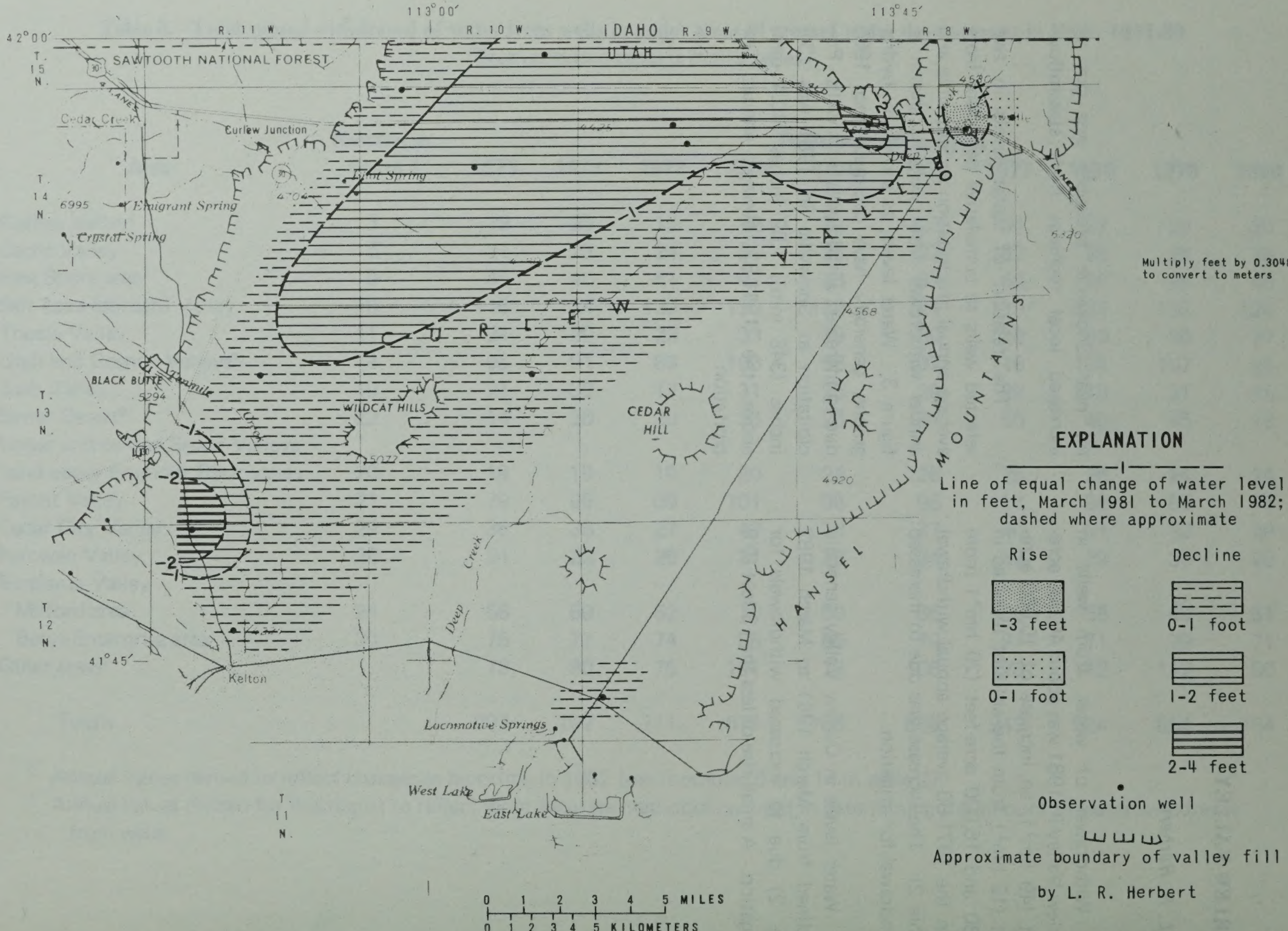


Figure 2.—Map of Curlew Valley showing change of water levels from March 1981 to March 1982.

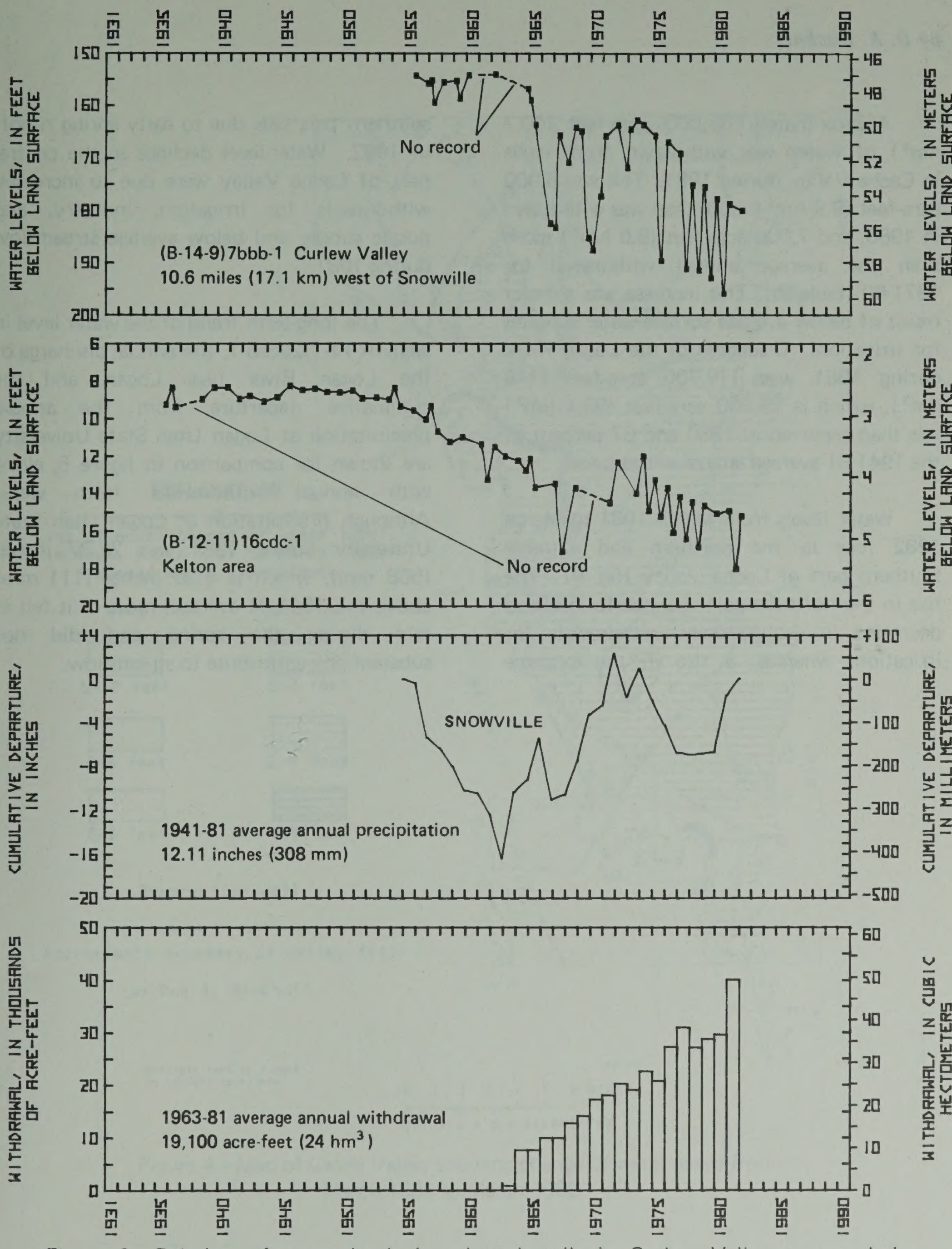


Figure 3.—Relation of water levels in selected wells in Curlew Valley to cumulative departure from the average annual precipitation at Snowville and to annual withdrawals from wells.

CACHE VALLEY

by D. A. Bischoff

Approximately 33,000 acre-feet (40.7 hm^3) of water was withdrawn from wells in Cache Valley during 1981. This was 8,000 acre-feet (9.9 hm^3) more than was withdrawn in 1980, and 7,000 acre-feet (8.6 hm^3) more than the average annual withdrawal for 1971-80 (table 2). This increase was a direct result of below average surface-water supplies for irrigation. Discharge of the Logan River during 1981 was 119,700 acre-feet (148 hm^3), which is 79,800 acre-feet (98.4 hm^3) less than reported in 1980 and 67 percent of the 1941-81 average annual withdrawal.

Water levels from March 1981 to March 1982 rose in the northern and extreme southern part of Cache Valley (fig. 4). The rise in the northern part was due to localized decreases in ground-water withdrawals for irrigation, whereas, a rise in the extreme southern part was due to early spring runoff in 1982. Water-level declines in the central part of Cache Valley were due to increased withdrawals for irrigation, industry, and public supply and below average streamflow during 1981.

The long-term trend of the water level in well (A-12-1)29cab-1, the annual discharge of the Logan River near Logan, and the cumulative departure from the annual precipitation at Logan Utah State University are shown for comparison in figure 5, along with annual withdrawals from wells. Although precipitation at Logan Utah State University during 1981 was 22.37 inches (568 mm), which is 4.36 inches (111 mm) above the 1941-81 average, most of it fell as rain during the spring and did not substantially contribute to streamflow.

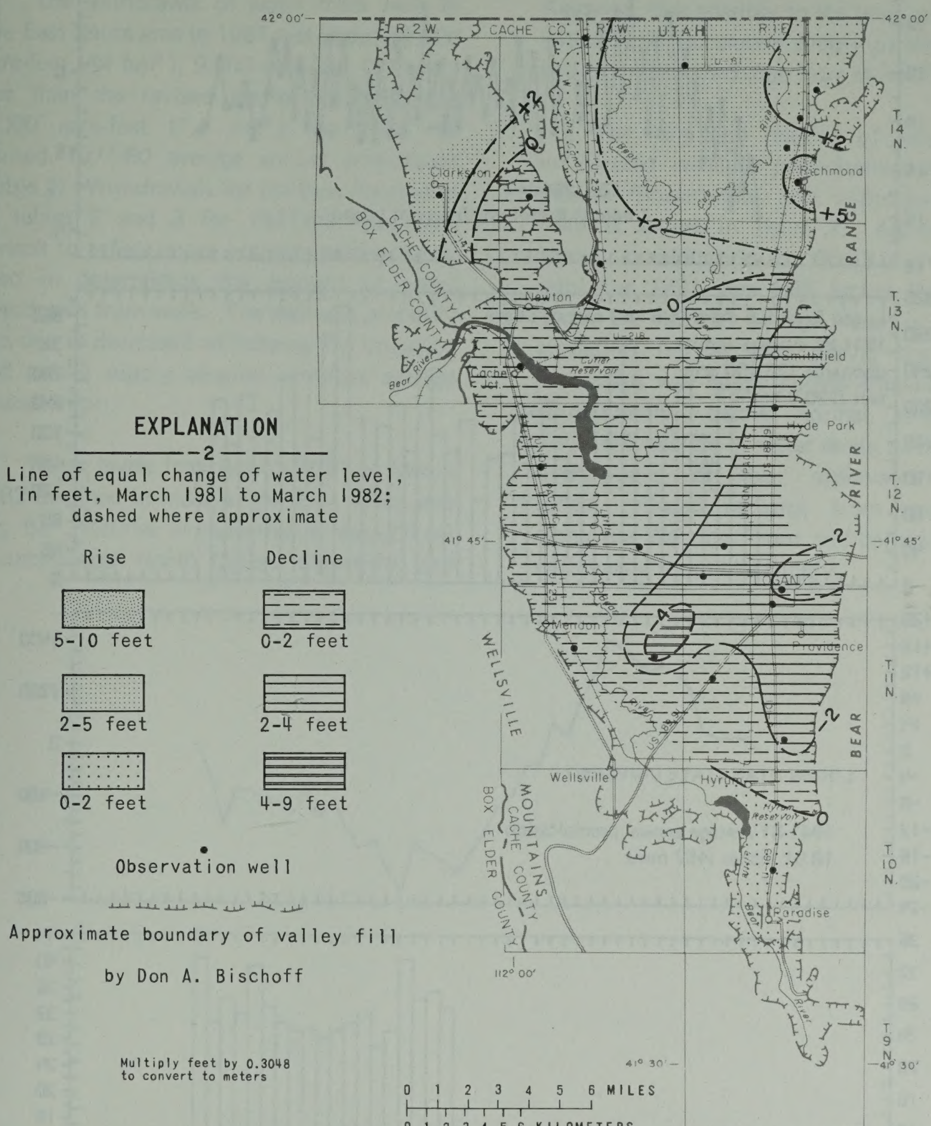


Figure 4.—Map of Cache Valley showing change of water levels from March 1981 to March 1982.

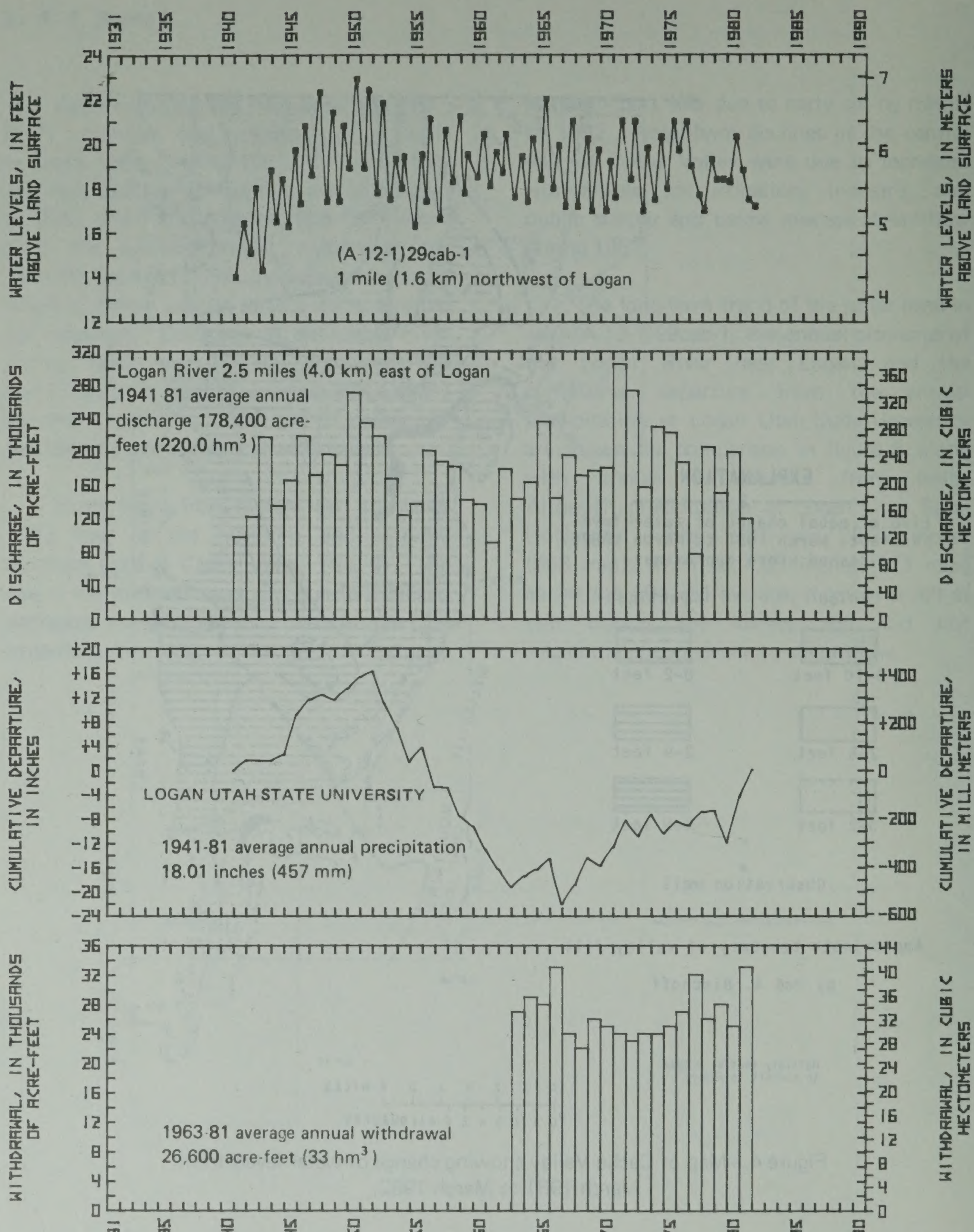


Figure 5.--Relation of water levels in well (A-12-1)29cab-1 in Cache Valley to discharge of the Logan River near Logan, to cumulative departure from the average annual precipitation at Logan Utah State University, and to annual withdrawals from wells.

EAST SHORE AREA

by Melanie E. Smith

The withdrawal of water from wells in the East Shore area in 1981 was about 36,000 acre-feet (44 hm^3), 9,000 acre-feet (11 hm^3) less than the revised figures for 1980 and 6,000 acre-feet (7.4 hm^3) less than the revised 1971-80 average annual withdrawal (table 2). Withdrawals for the East Shore area in tables 2 and 3 for 1971-80 have been revised to reflect more accurate methodology used in determining the amount of water withdrawn from wells. The decrease probably was due to decreased withdrawal for irrigation and public supply because of above average precipitation.

Water levels from March 1981 to March 1982 declined in most of the East Shore area (fig. 6). Declines of more than 8 feet (2.4 m) occurred near North Ogden, Clearfield, and Kaysville, due possibly to the large, continued withdrawals for public supply in these areas and to reduced recharge from streamflow.

The long-term relation of water levels in selected wells to precipitation at Ogden Pioneer powerhouse and withdrawal from wells is shown in figure 7. Although the annual precipitation of 25.33 inches (643 mm) for 1981 was 4.29 inches (109 mm) above the 1937-81 average, much of the precipitation fell as rain during the spring. The result was below normal snowpack and, consequently, below normal streamflow. Thus, the decline in water levels, as shown by hydrographs of four observation wells, reflect reduced recharge from streamflow along the Wasatch Front and continual large withdrawal for public supply.

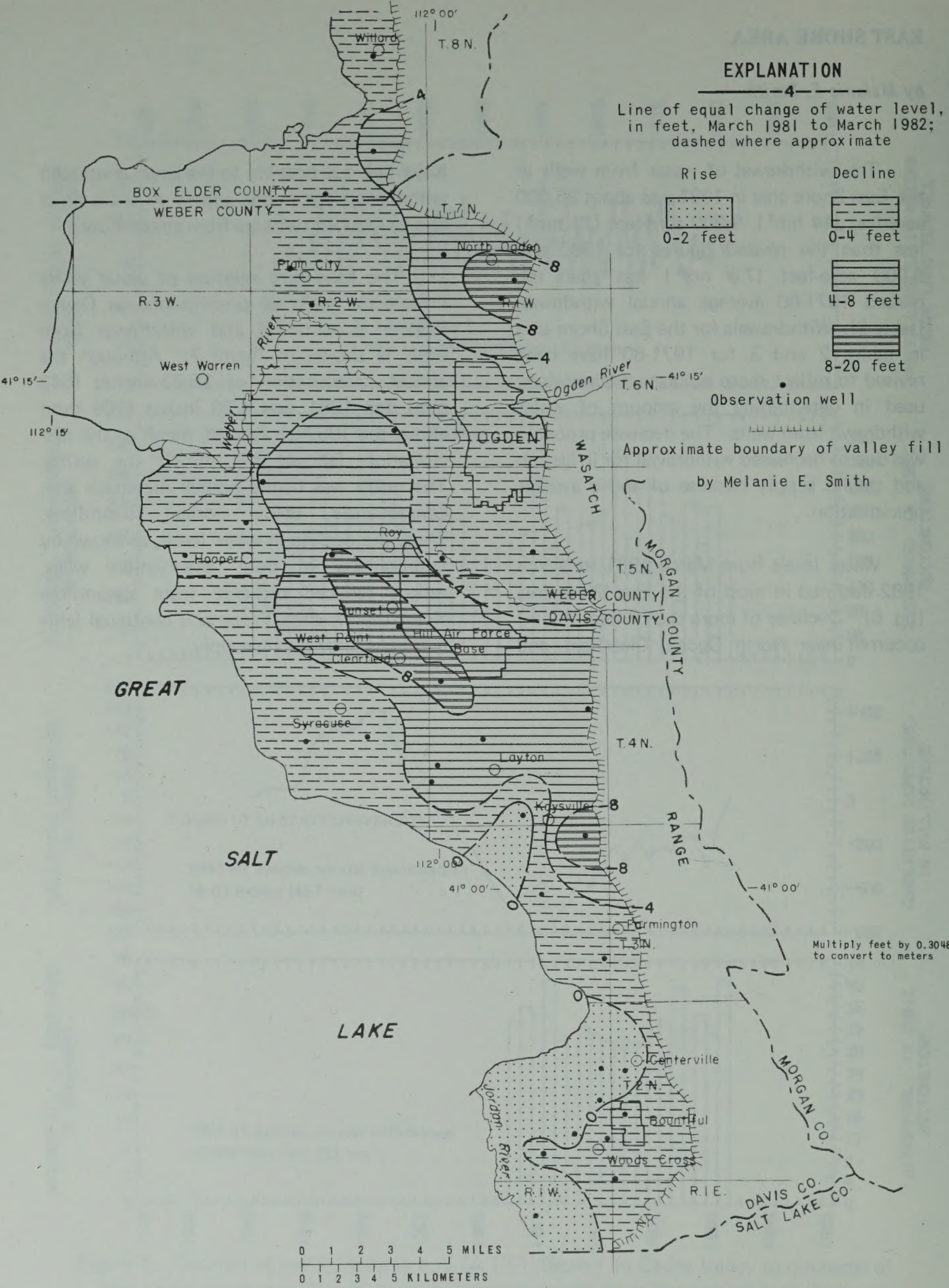


Figure 6.—Map of the East Shore area showing change of water levels from March 1981 to March 1982.

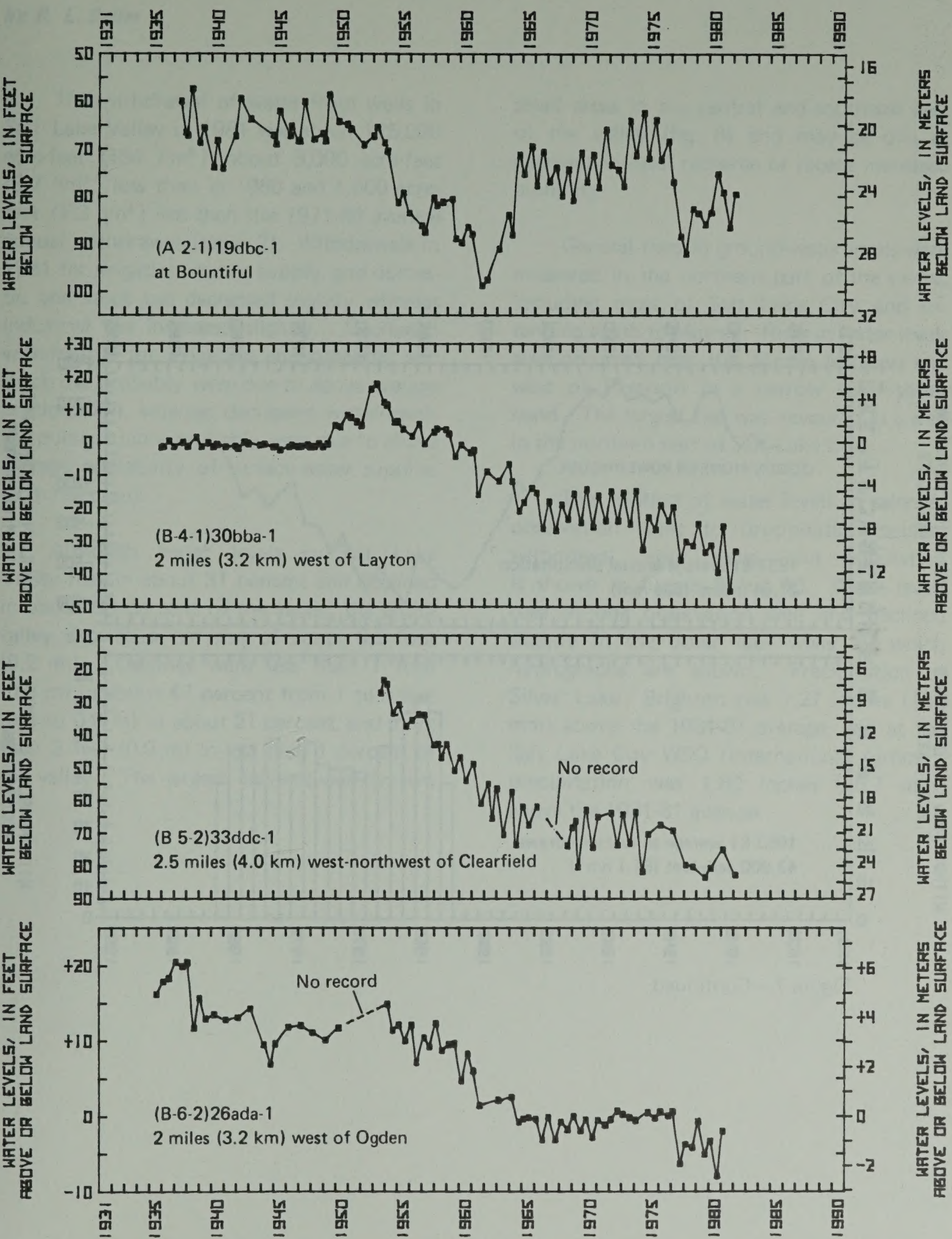


Figure 7.—Relation of water levels in selected wells in the East Shore area to cumulative departure from the average annual precipitation at Ogden Pioneer powerhouse and to annual withdrawals from wells.

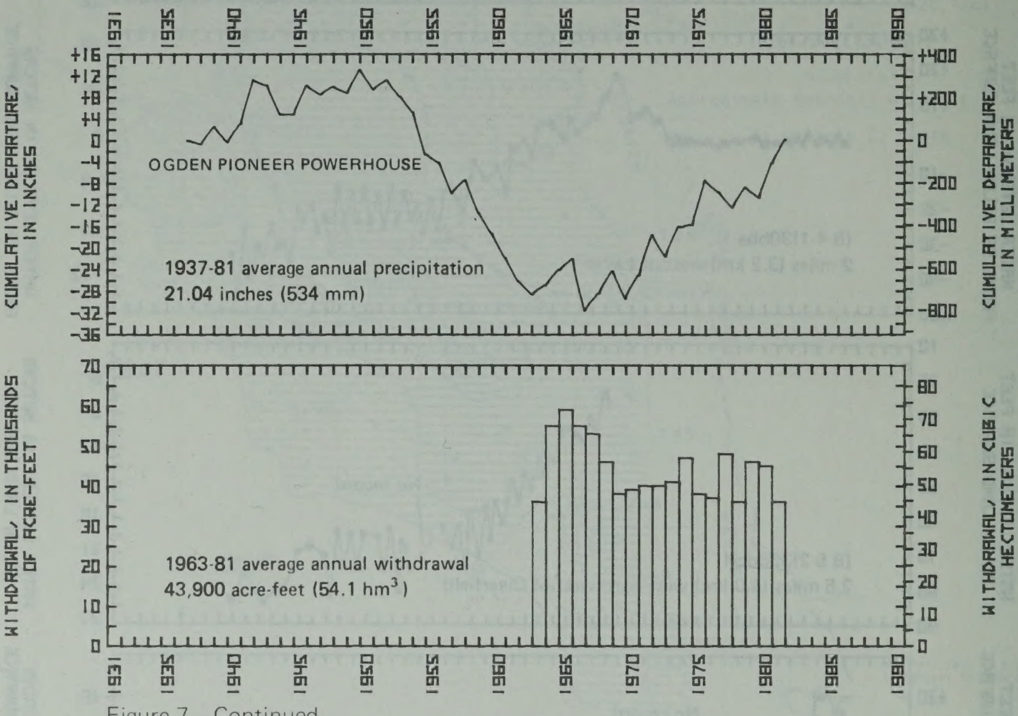


Figure 7.—Continued

SALT LAKE (JORDAN) VALLEY

by R. L. Seiler

The withdrawal of water from wells in Salt Lake Valley in 1981 was about 125,000 acre-feet (154 hm^3), about 3,000 acre-feet (3.7 hm^3) less than in 1980 and 1,000 acre-feet (1.2 hm^3) less than the 1971-80 average annual withdrawal (table 2). Withdrawals in 1981 for irrigation, public supply, and domestic and stock use decreased slightly whereas industrial use increased slightly. Decreased withdrawals for irrigation and domestic and stock use probably were due to above average precipitation, whereas decreased withdrawals for public supply probably were due to above average availability of surface-water supplies from reservoirs.

Although water levels in Salt Lake Valley rose in about 31 percent and declined in about 69 percent of the valley, the entire valley showed a net rise of about 0.5 foot (0.2 m). Declines were less than 1 foot (0.3 m) in about 47 percent from 1 to 3 feet (0.3 to 0.9 m) in about 21 percent, and more than 3 feet (0.9 m) in less than 1 percent of the valley. The largest declines were in two small areas in the central and southeast part of the valley (fig. 8) and may be due to decrease in local recharge or recent increased pumping.

General rises in ground-water levels were measured in the northern part of the valley, including most of Salt Lake City and extending south to Murray. Rises in water levels also occurred near the Jordan Narrows and west of Riverton in a narrow north-south band. The largest rise was measured in a well in the northern part of Salt Lake City.

The relation of water levels in selected observation wells to precipitation, annual withdrawal from wells, and population is shown in figures 9 and 10. Water levels rose in one observation well and declined slightly in the other four wells for which hydrographs are shown. Precipitation at Silver Lake Brighton was 7.27 inches (185 mm) above the 1931-81 average, and at the Salt Lake City WSO (International Airport), precipitation was 1.80 inches (45.7 mm) above the 1931-81 average.

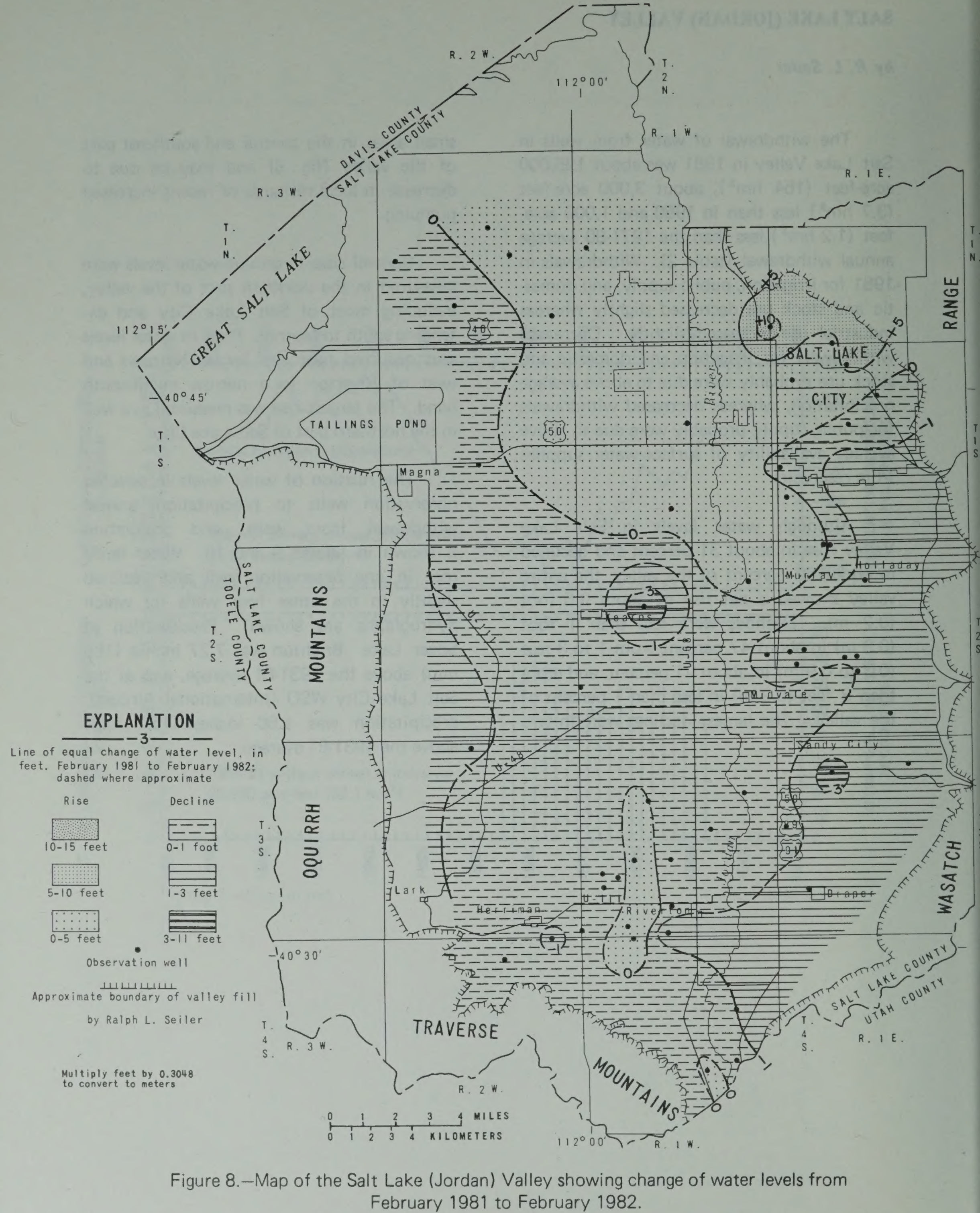


Figure 8.—Map of the Salt Lake (Jordan) Valley showing change of water levels from February 1981 to February 1982.

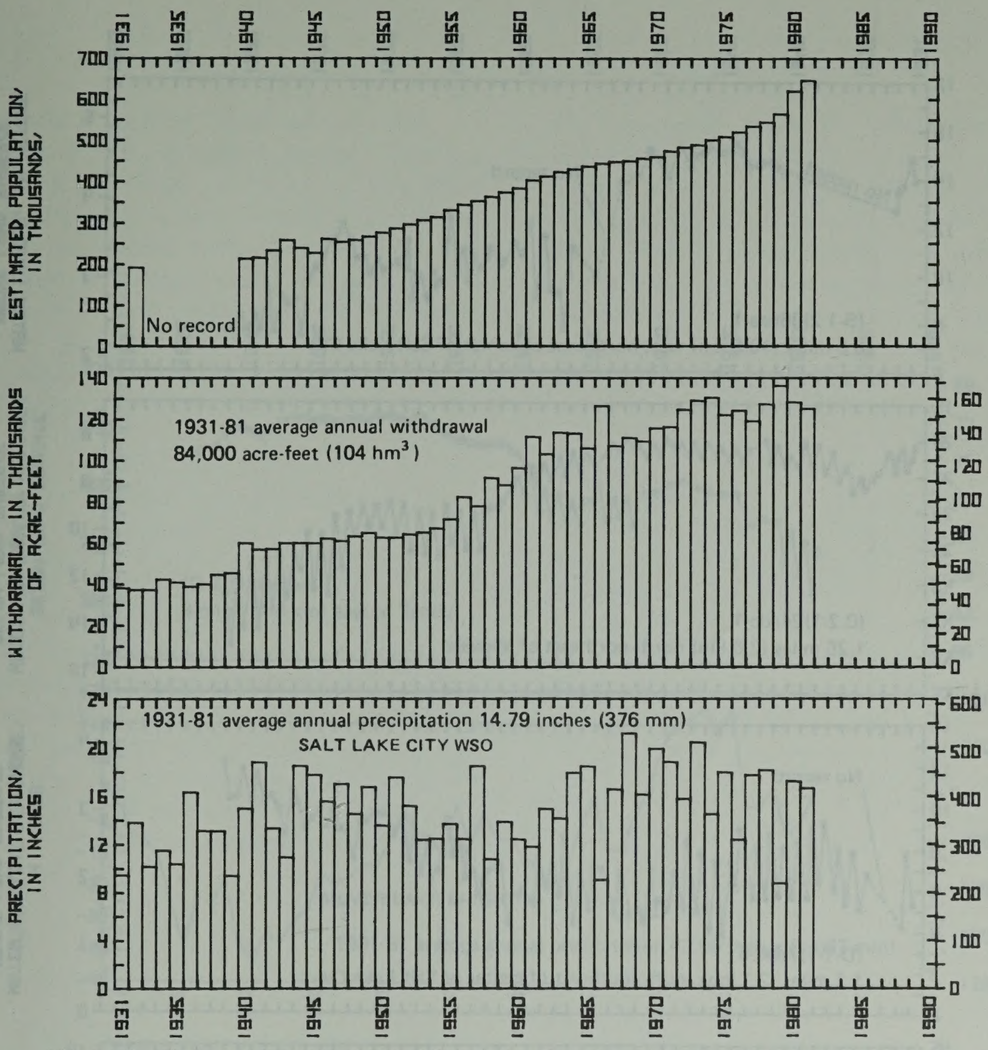


Figure 9.--Estimated population of Salt Lake County, annual withdrawals from wells, and average annual precipitation at Salt Lake City WSO (International Airport).

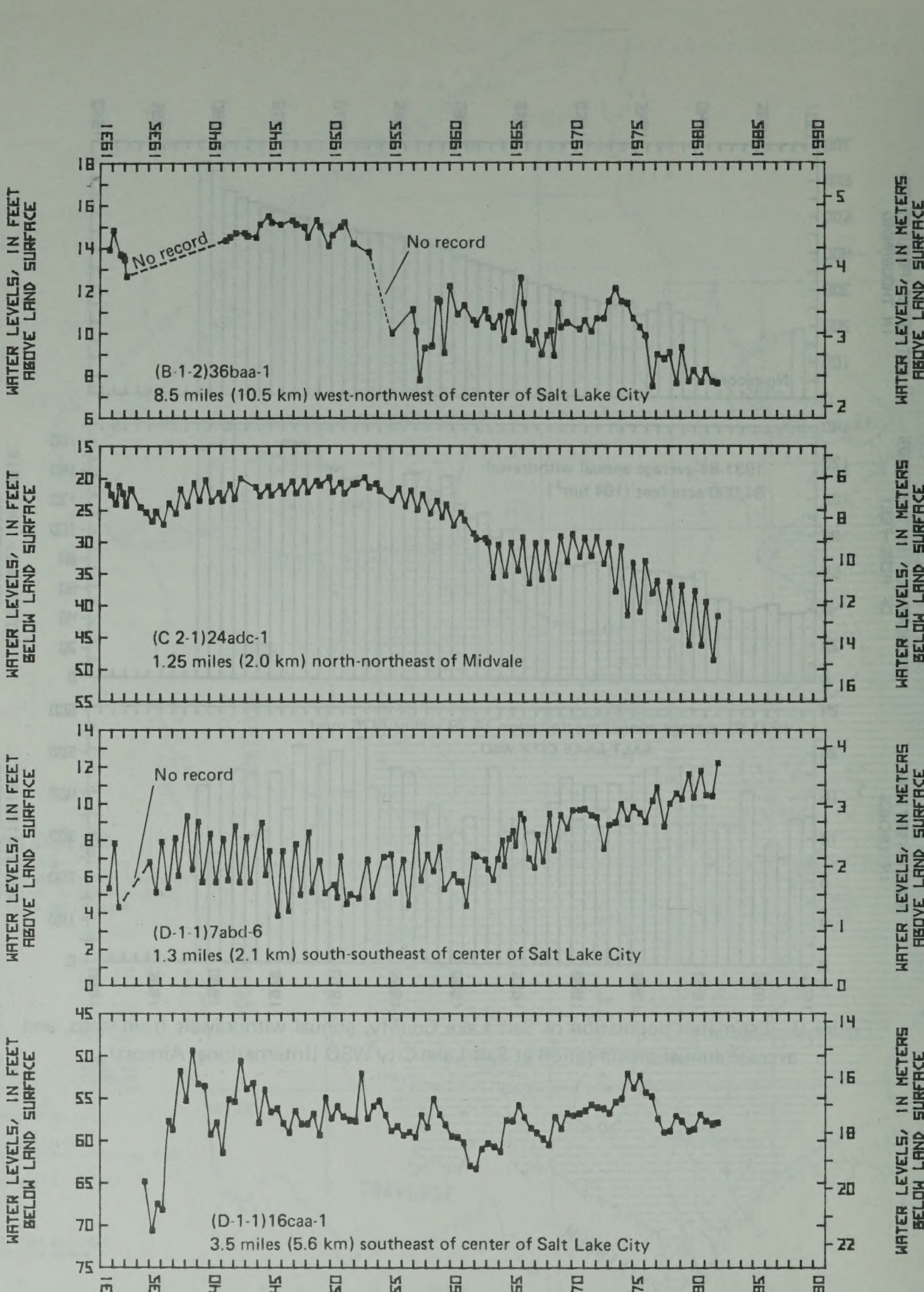


Figure 10.—Relation of water levels in selected wells in the Salt Lake (Jordan) Valley to cumulative departure from the average annual precipitation at Silver Lake Brighton.

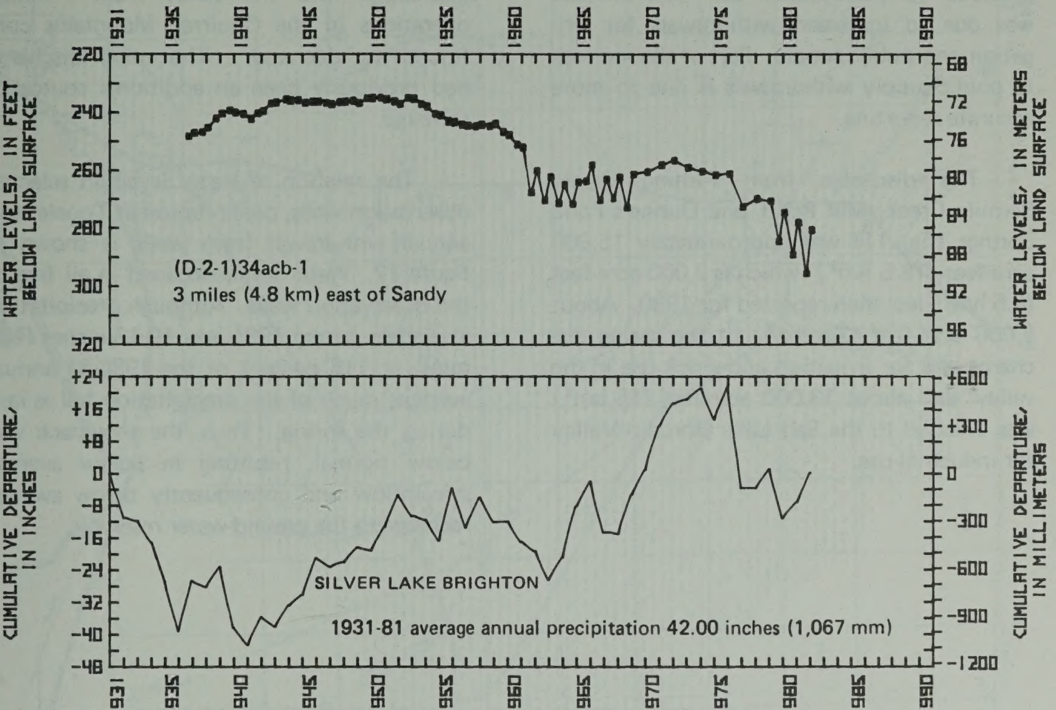


Figure 10.—Continued

TOOELE VALLEY

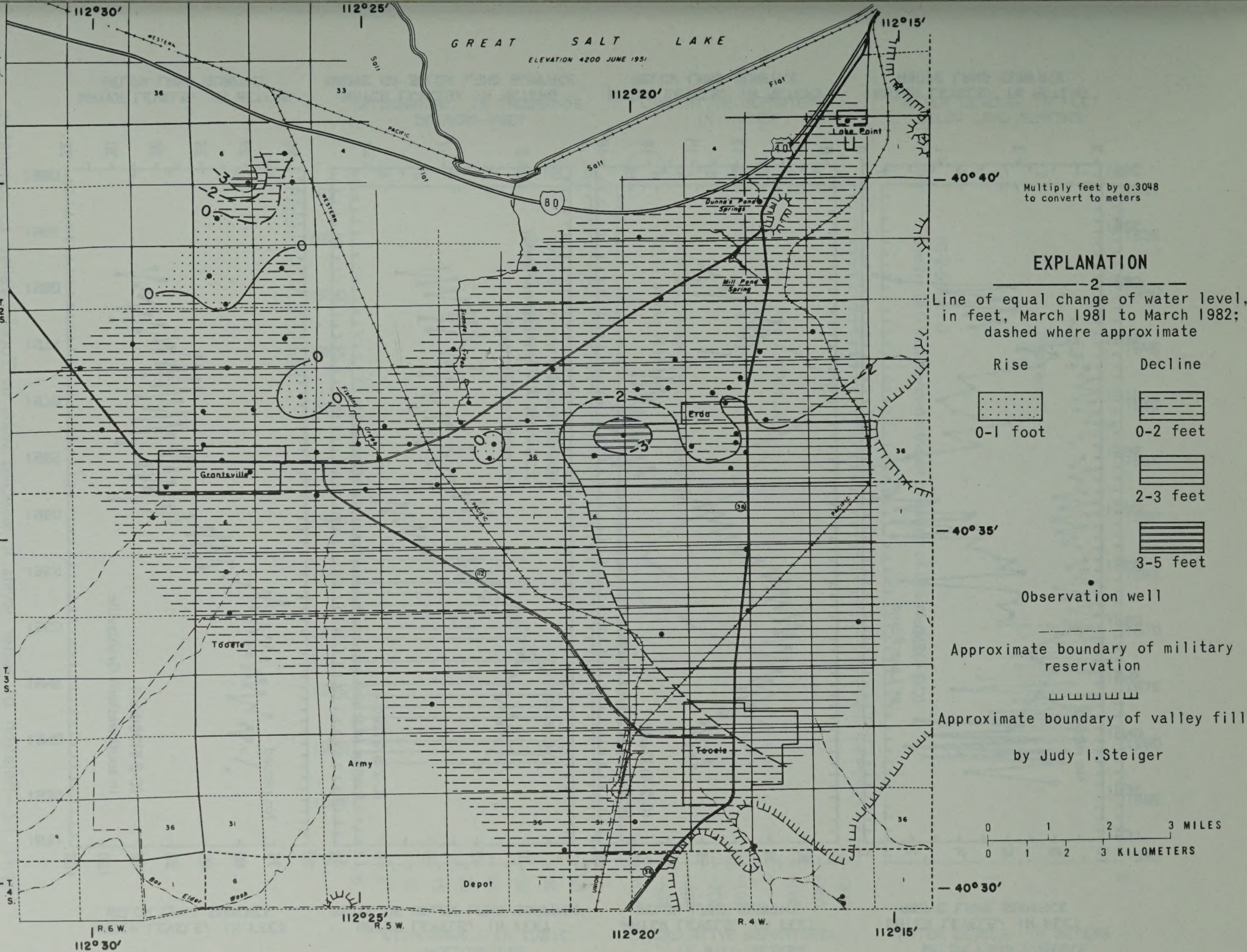
by Judy I. Steiger

Withdrawal of water from wells in Tooele Valley during 1981 was approximately 30,000 acre-feet (37 hm^3). This amount is 3,000 acre-feet (3.7 hm^3) more than reported for 1980 and 1,000 acre-feet (1.2 hm^3) more than the average annual withdrawal for the previous 10 years (table 2). The increase was due to increased withdrawals for irrigation and public supply. Part of the increase in public-supply withdrawals is due to more accurate reporting.

The discharge from Fishing Creek, Sixmile Creek, Mill Pond, and Dunne's Pond Springs (fig. 11) was approximately 15,000 acre-feet (18.5 hm^3), which is 2,000 acre-feet (2.5 hm^3) less than reported for 1980. About 2,000 acre-feet (2.5 hm^3) of the spring discharge was for irrigation and stock use in the valley, and about 13,000 acre-feet (16 hm^3) was diverted to the Salt Lake (Jordan) Valley for industrial use.

Ground-water levels in Tooele Valley generally declined, mostly due to increased withdrawal for irrigation. Declines of 2 to 3 feet (0.6 to 0.9 m) occurred in the southeast part of the valley where streamflow was below normal and where the amount of water discharged into the valley from mining operations in the Oquirrah Mountains continued to decrease. The mine discharge had previously been an additional source of recharge.

The relation of water levels in selected observation wells, precipitation at Tooele, and annual withdrawal from wells is shown in figure 12. Water levels declined in all five of the observation wells. Although precipitation at Tooele during 1981 was 19.13 inches (486 mm), or 116 percent of the 1936-81 annual average, much of the precipitation fell as rain during the spring. Thus, the snowpack was below normal, resulting in below average streamflow and consequently below average recharge to the ground-water reservoir.



25

Figure 11.—Map of Tooele Valley showing change of water levels in artesian aquifers from March 1981 to March 1982.

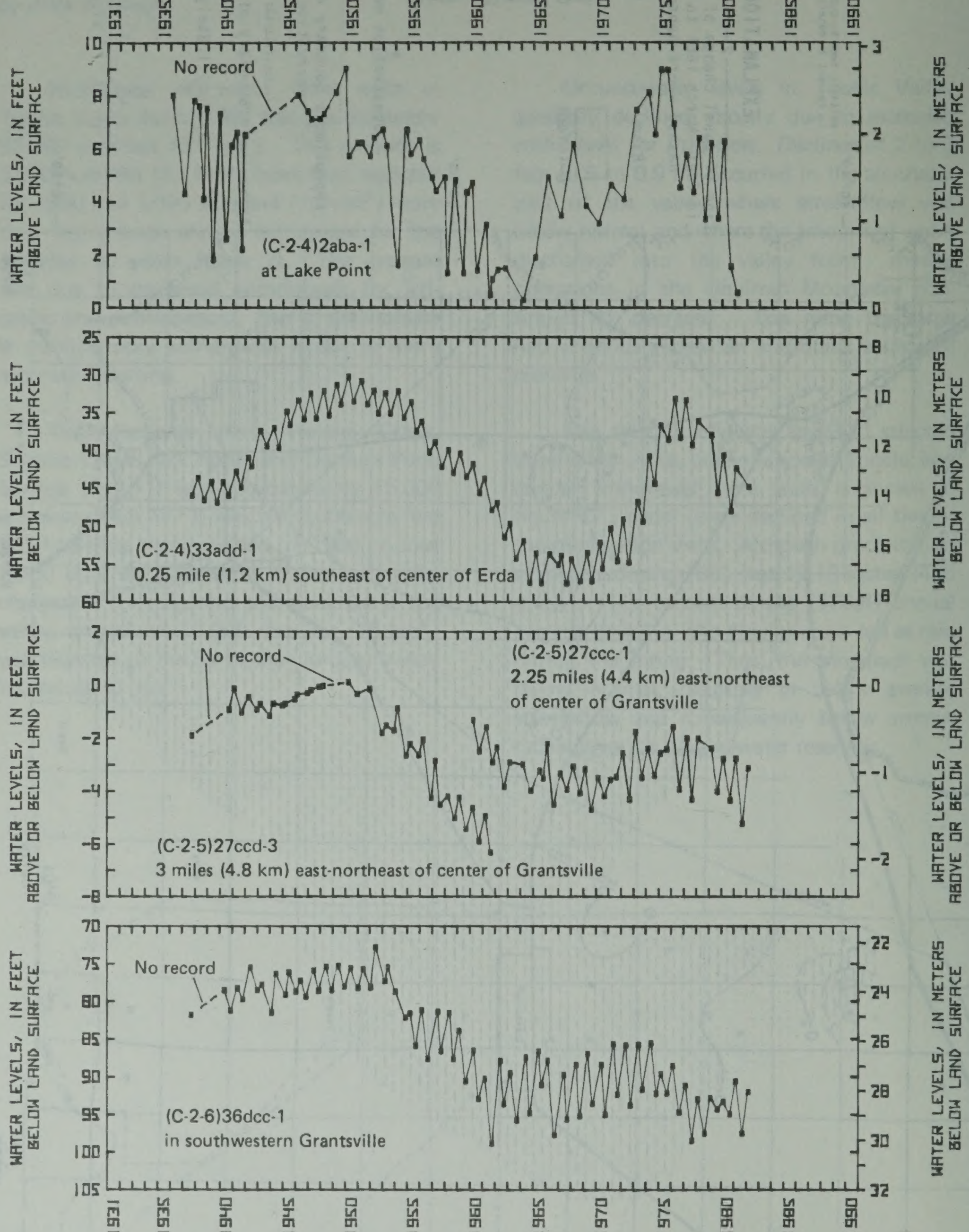


Figure 12.—Relation of water levels in selected wells in Tooele Valley to cumulative departure from the average annual precipitation at Tooele and to annual withdrawals from wells.

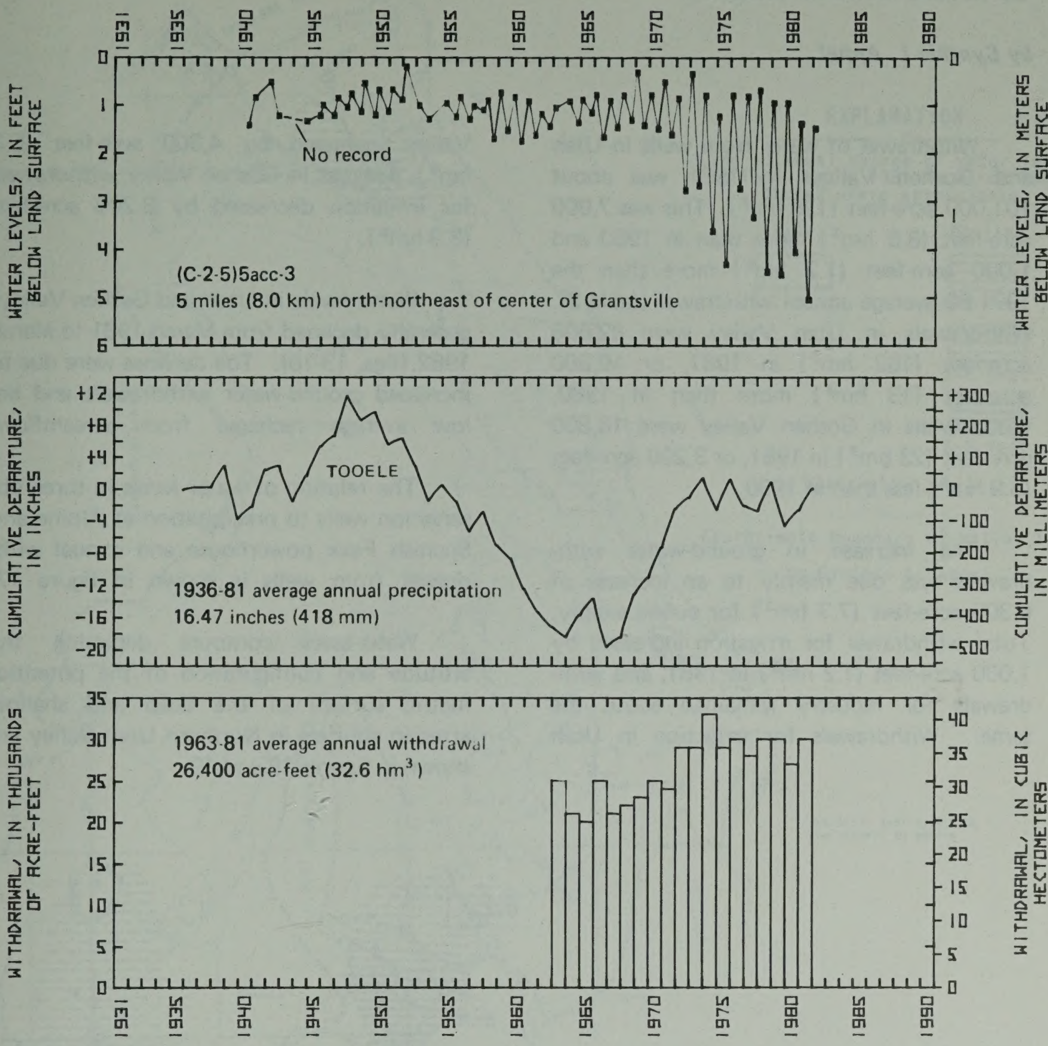


Figure 12.—Continued

UTAH AND GOSHEN VALLEYS

by Cynthia L. Appel

Withdrawal of water from wells in Utah and Goshen Valleys in 1981 was about 101,000 acre-feet (125 hm^3). This was 7,000 acre-feet (8.6 hm^3) more than in 1980 and 1,000 acre-feet (1.2 hm^3) more than the 1971-80 average annual withdrawal (table 2). Withdrawals in Utah Valley were 82,600 acre-feet (102 hm^3) in 1981, or 10,900 acre-feet (13 hm^3) more than in 1980. Withdrawals in Goshen Valley were 18,800 acre-feet (23 hm^3) in 1981, or 3,200 acre-feet (3.9 hm^3) less than in 1980.

The increase in ground-water withdrawals was due mainly to an increase of 6,300 acre-feet (7.3 hm^3) for public supply. Total withdrawal for irrigation increased by 1,000 acre-feet (1.2 hm^3) in 1981, and withdrawals for industry remained about the same. Withdrawals for irrigation in Utah Valley increased by 4,300 acre-feet (5.3 hm^3), whereas in Goshen Valley, withdrawals for irrigation decreased by 3,200 acre-feet (3.9 hm^3).

Water levels in Utah and Goshen Valleys generally declined from March 1981 to March 1982 (figs. 13-16). The declines were due to increased ground-water withdrawals and below average recharge from streamflow.

The relation of water levels in three observation wells to precipitation at Alpine and Spanish Fork powerhouse and annual withdrawal from wells is shown in figure 17.

Water-level contours depicting the altitude and configuration of the potentiometric surface of the deep and shallow artesian aquifers in Northern Utah Valley are shown in figures 18 and 19.

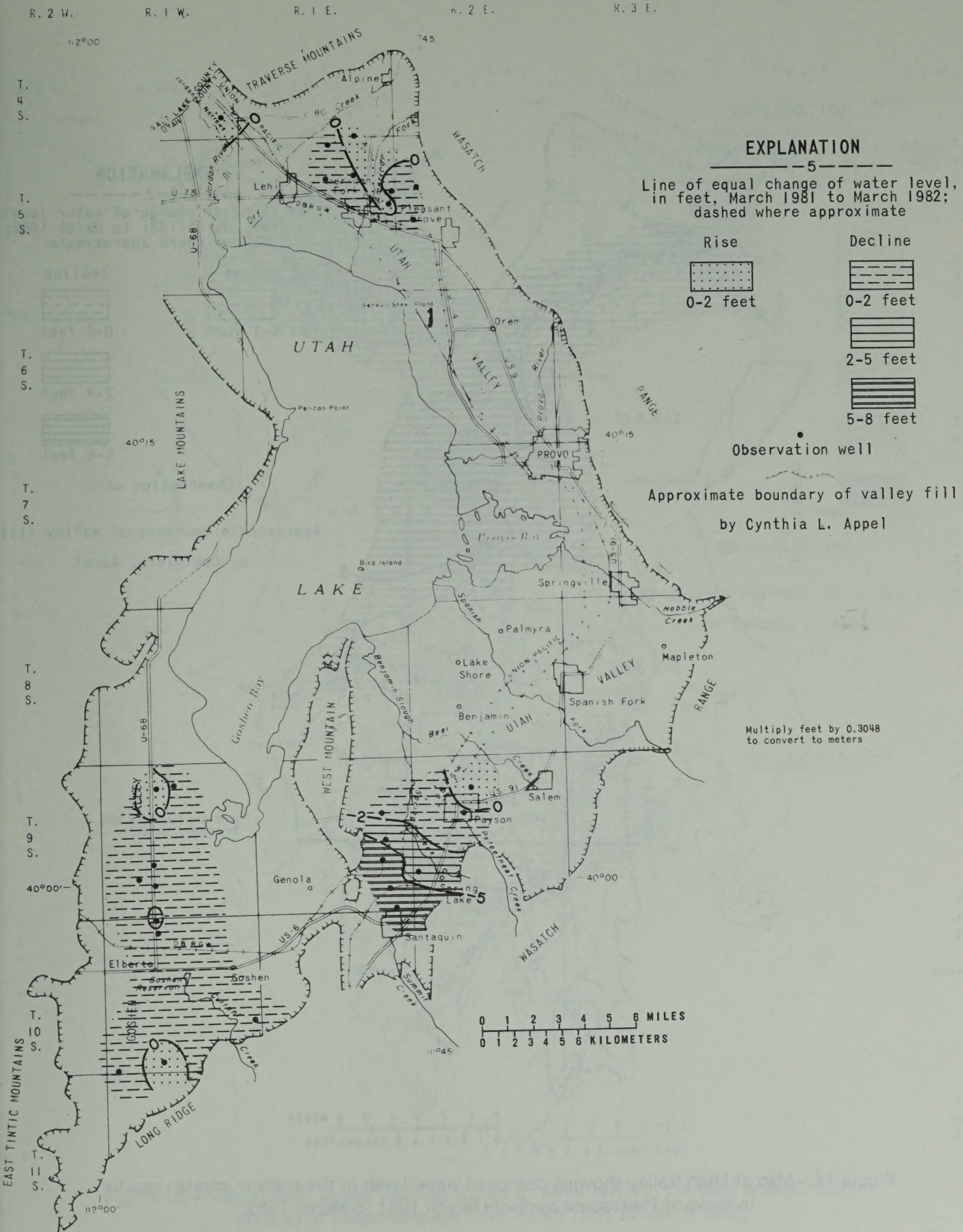


Figure 13.–Map of Utah and Goshen Valleys showing change of water levels in the water-table aquifers from March 1981 to March 1982.

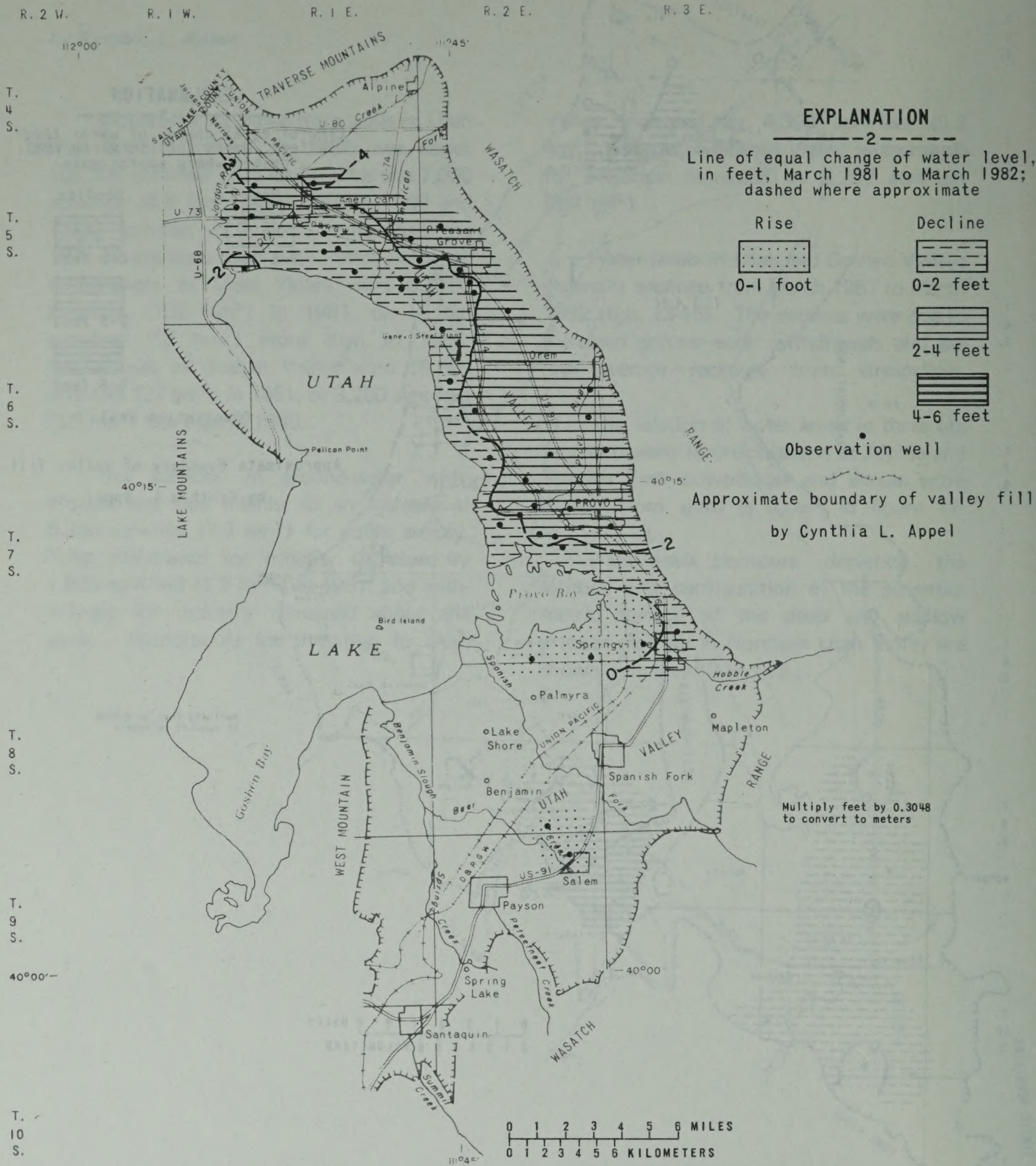


Figure 14.—Map of Utah Valley showing change of water levels in the shallow artesian aquifer in rocks of Pleistocene age from March 1981 to March 1982.

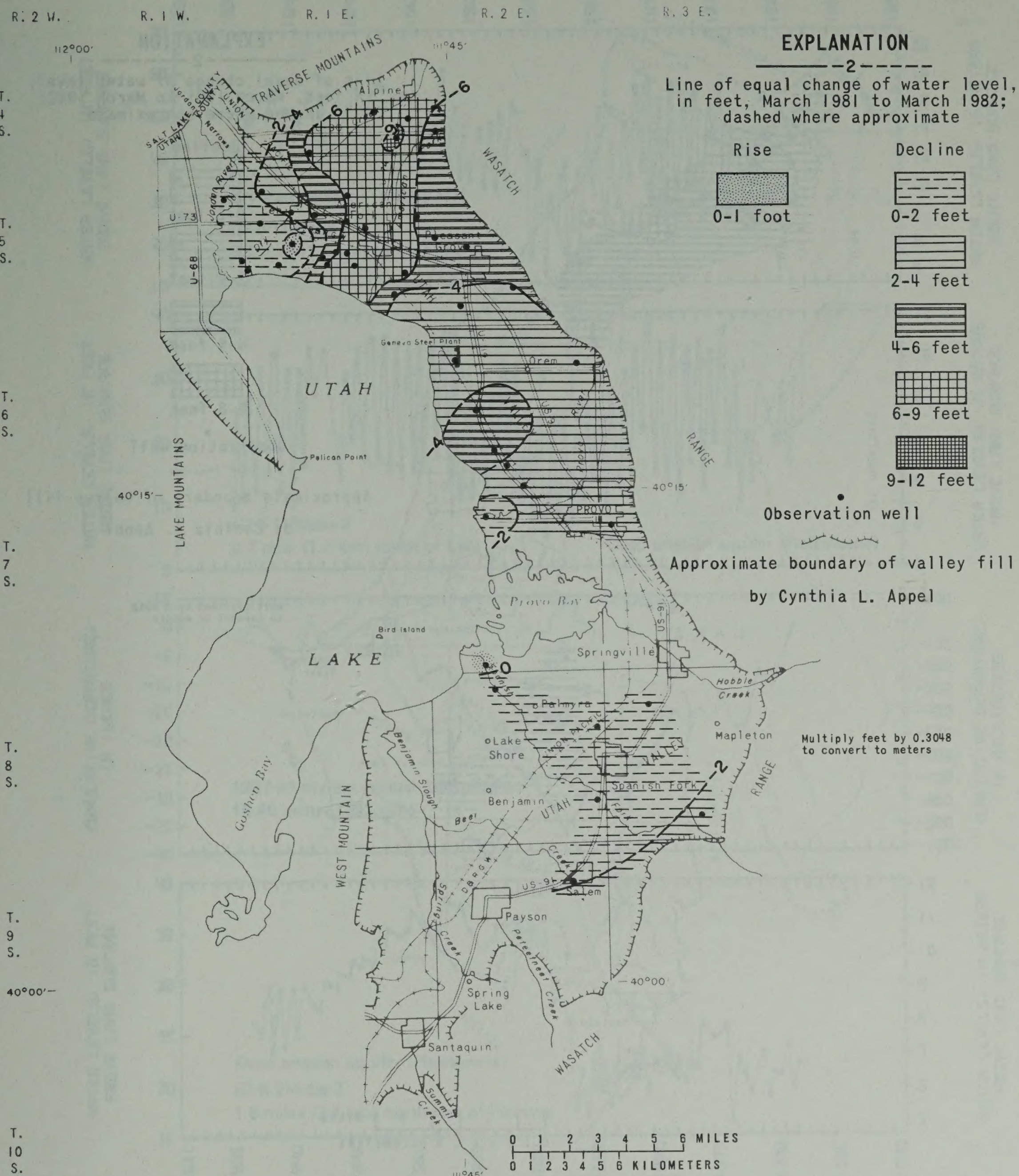


Figure 15.—Map of Utah Valley showing change of water levels in the deep artesian aquifer in rocks of Pleistocene age from March 1981 to March 1982.

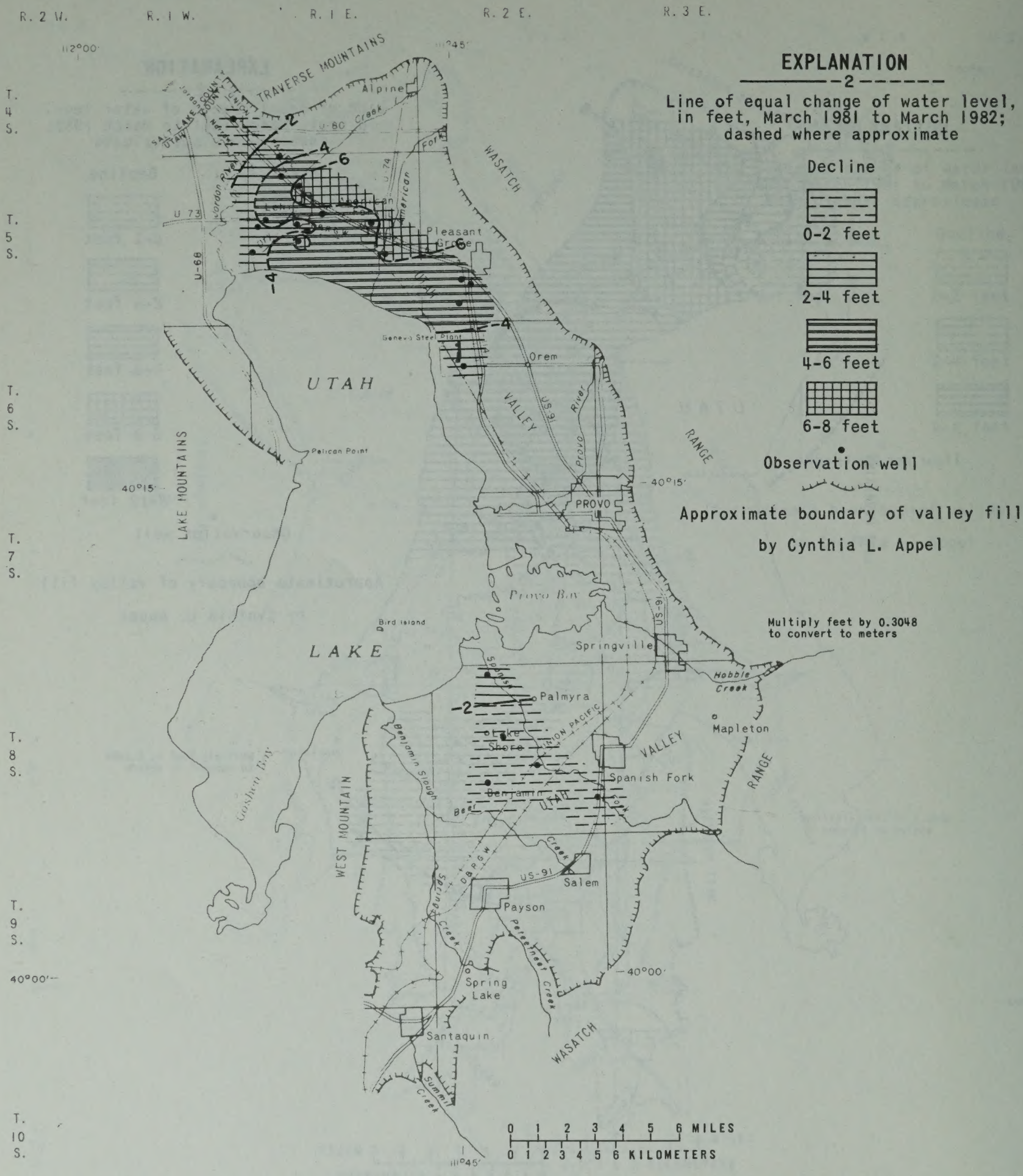


Figure 16.—Map of Utah Valley showing change of water levels in the artesian aquifer in rocks of Tertiary(?) age from March 1981 to March 1982.

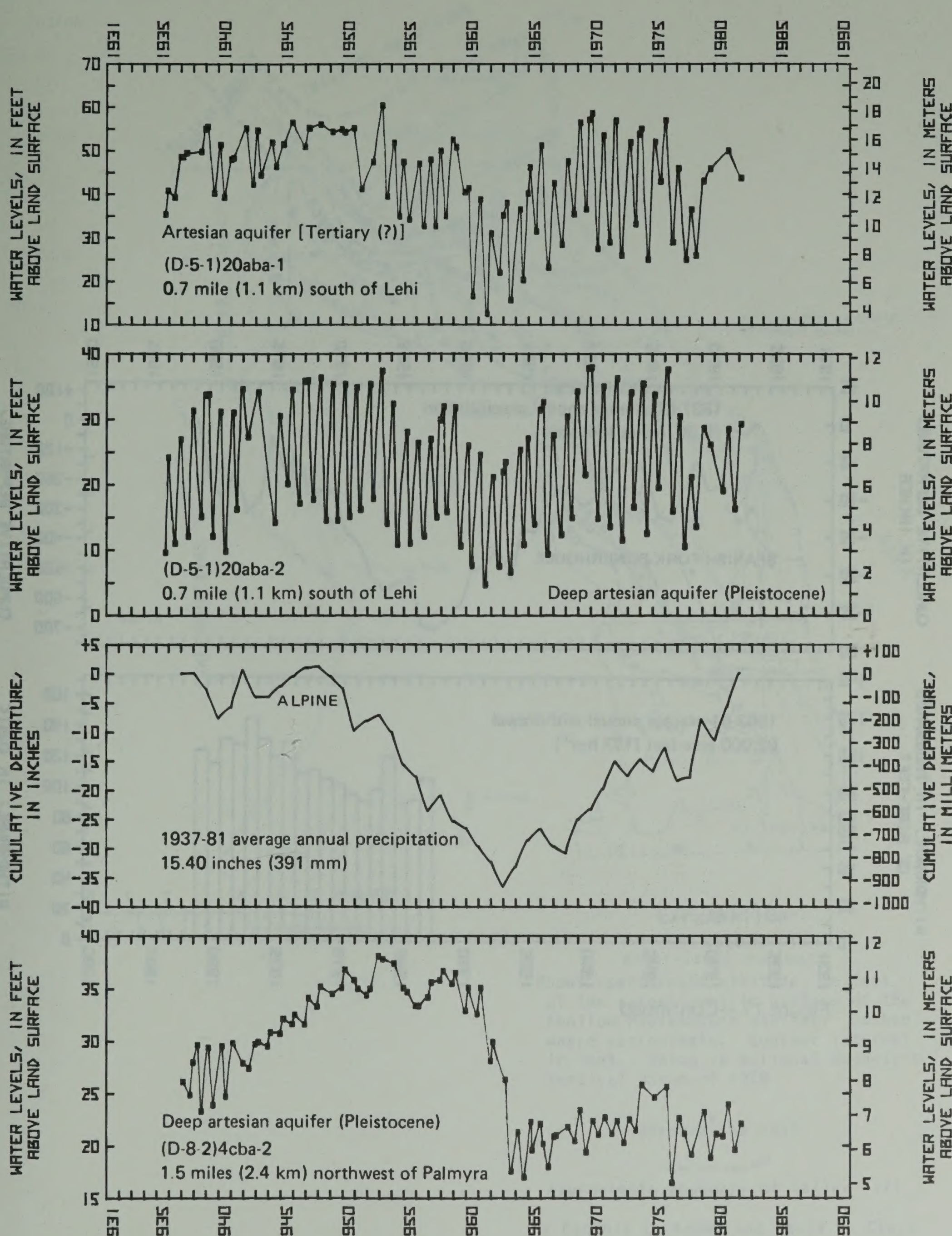


Figure 17.—Relation of water levels in selected wells to cumulative departure from the average annual precipitation at Alpine and Spanish Fork powerhouse and annual withdrawals from wells in Utah and Goshen Valleys.

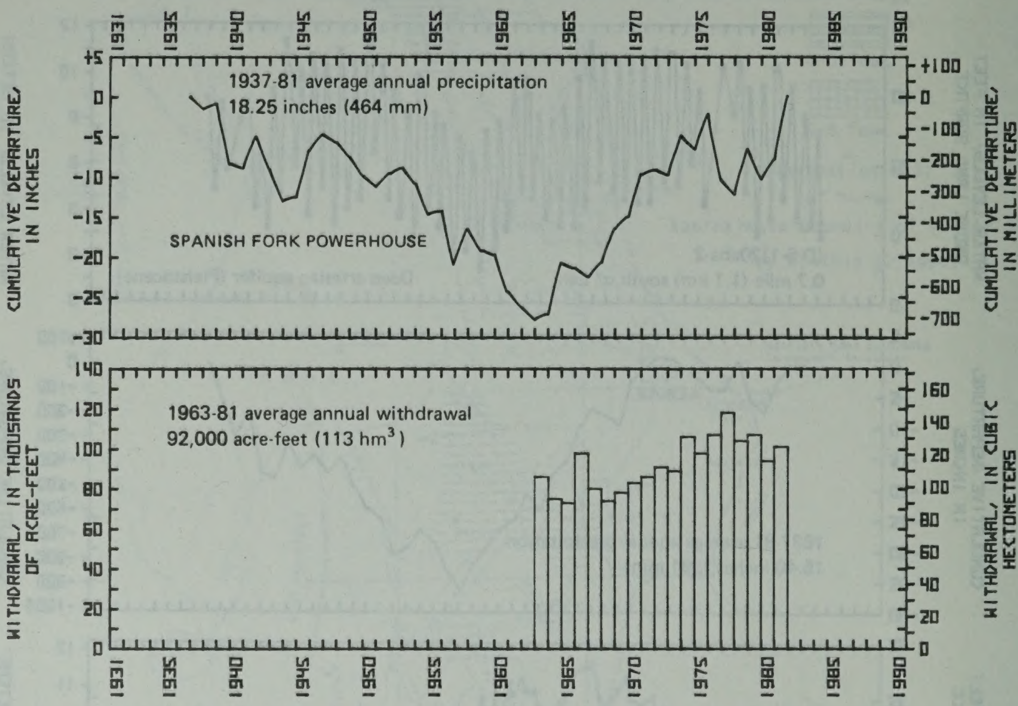


Figure 17.—Continued

EXPLANATION

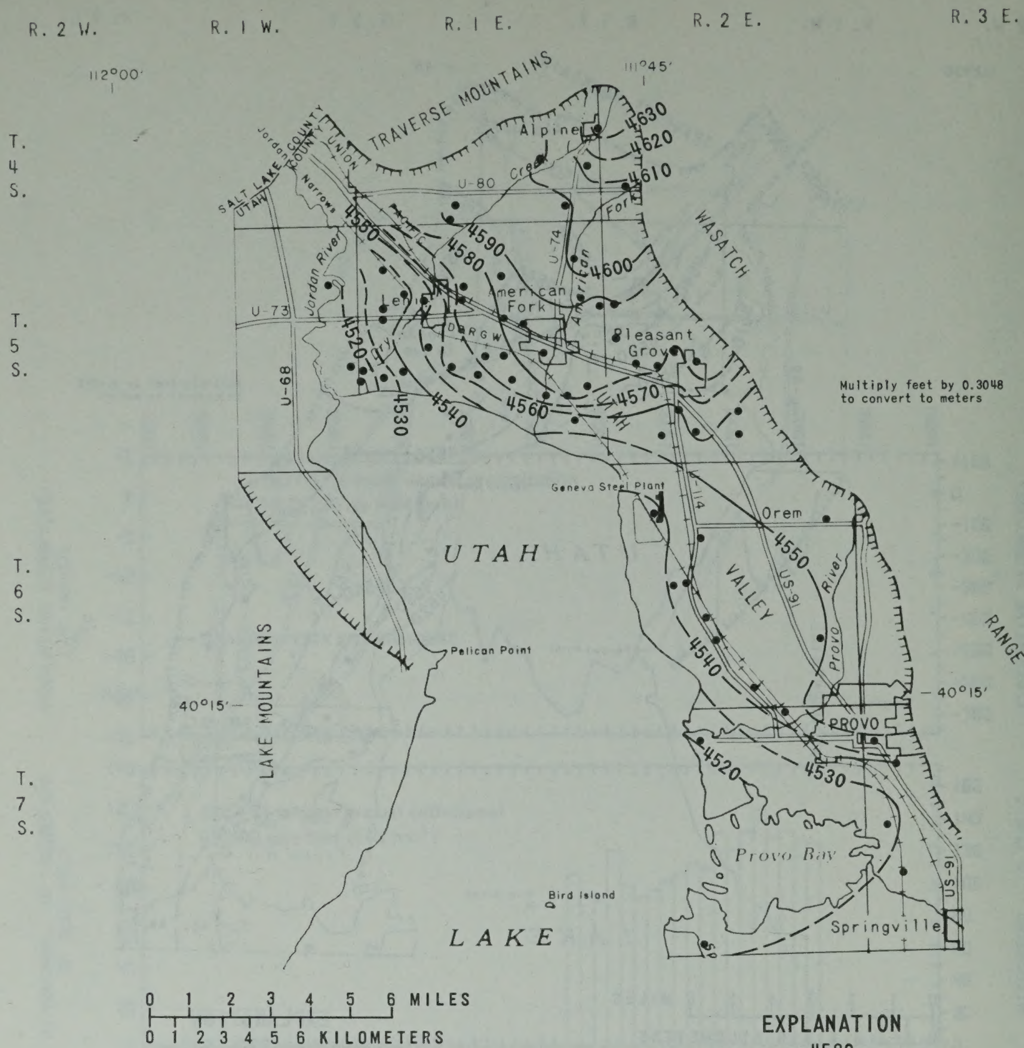
——4520— — —
Water-level contour
Shows approximate altitude, in feet, of the potentiometric surface of the shallow Pleistocene aquifer. Dashed where approximate. Contour interval 10 feet. Datum is National Geodetric Vertical Datum of 1929

Observation well

Approximate boundary of valley fill

by Cynthia L. Appel and David W. Clark

Figure 18.—Map of northern Utah Valley showing the approximate potentiometric surface, shallow Pleistocene aquifer, March 1982.



EXPLANATION

——4580— — —

Water-level contour

Shows approximate altitude, in feet, of the potentiometric surface of the deep Pleistocene aquifer. Dashed where approximate. Contour interval 10 feet. Datum is National Geodetic Vertical Datum of 1929

•

Observation well

Approximate boundary of valley fill

by Cynthia L. Appel and David W. Clark

Figure 19.—Map of northern Utah Valley showing the approximate potentiometric surface, deep Pleistocene aquifer, March 1982.

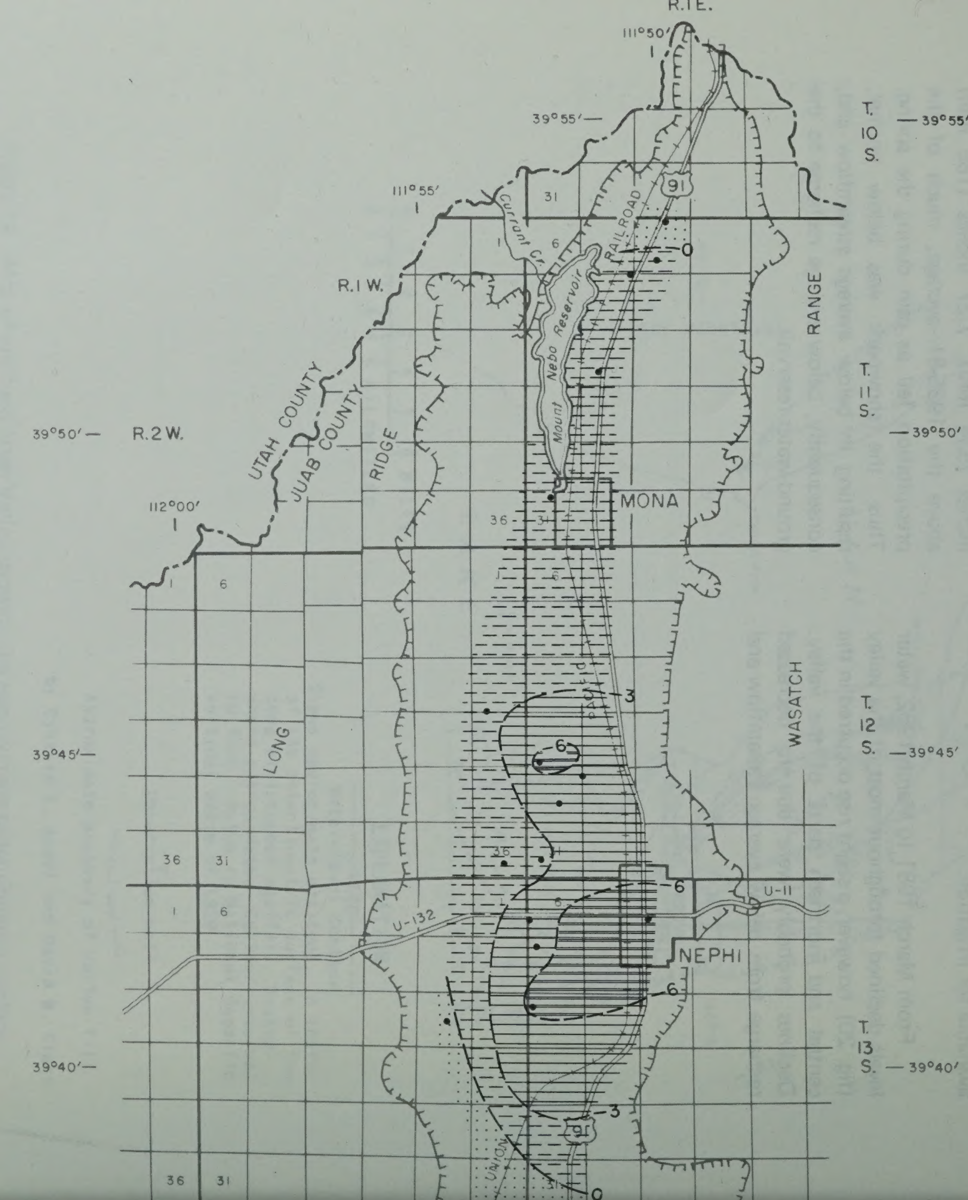
JUAB VALLEY

by V. L. Jensen

Withdrawal of water from wells in Juab Valley during 1981 was about 21,000 acre-feet (26 hm^3). This was 6,000 acre-feet (7.4 hm^3) more than reported for 1980 but 3,000 acre-feet (3.7 hm^3) less than the 1971-80 average annual withdrawals (table 2). The increase in withdrawals probably was due to the decreased amount of surface water available for irrigation.

From March 1981 to March 1982, water levels declined throughout most of the valley (fig. 20), however, a slight rise occurred in the central and northern parts of the valley. Declines probably were due to decreased recharge from below average streamflow and to the increased withdrawals of ground water for irrigation.

The relation between water levels in two selected wells and cumulative departure from the 1935-81 average annual precipitation at Nephi is shown in figure 21. Although precipitation at Nephi during 1981 was 21.02 inches (534 mm), 7.27 inches (185 mm) above the 1935-81 average, much of the precipitation fell as rain during the spring. Thus, the snowpack was below normal, resulting in below average streamflow and, consequently, below average recharge to the ground-water reservoir.


R.1E.
111°50′
39°55′
111°55′
Current Cr.
RAILROAD
Mount Nebo Reservoir
R.1 W.
UTAH COUNTY
JUAB COUNTY
RIDGE
39°50′
R.2 W.
112°00′
MONA
LONG
39°45′
PACIFIC
UNION
NEPHI
U-11
U-132
91
39°40′
T. 10 S.
T. 11 S.
T. 12 S.
T. 13 S.
RANGE
WASATCH
0
3
6

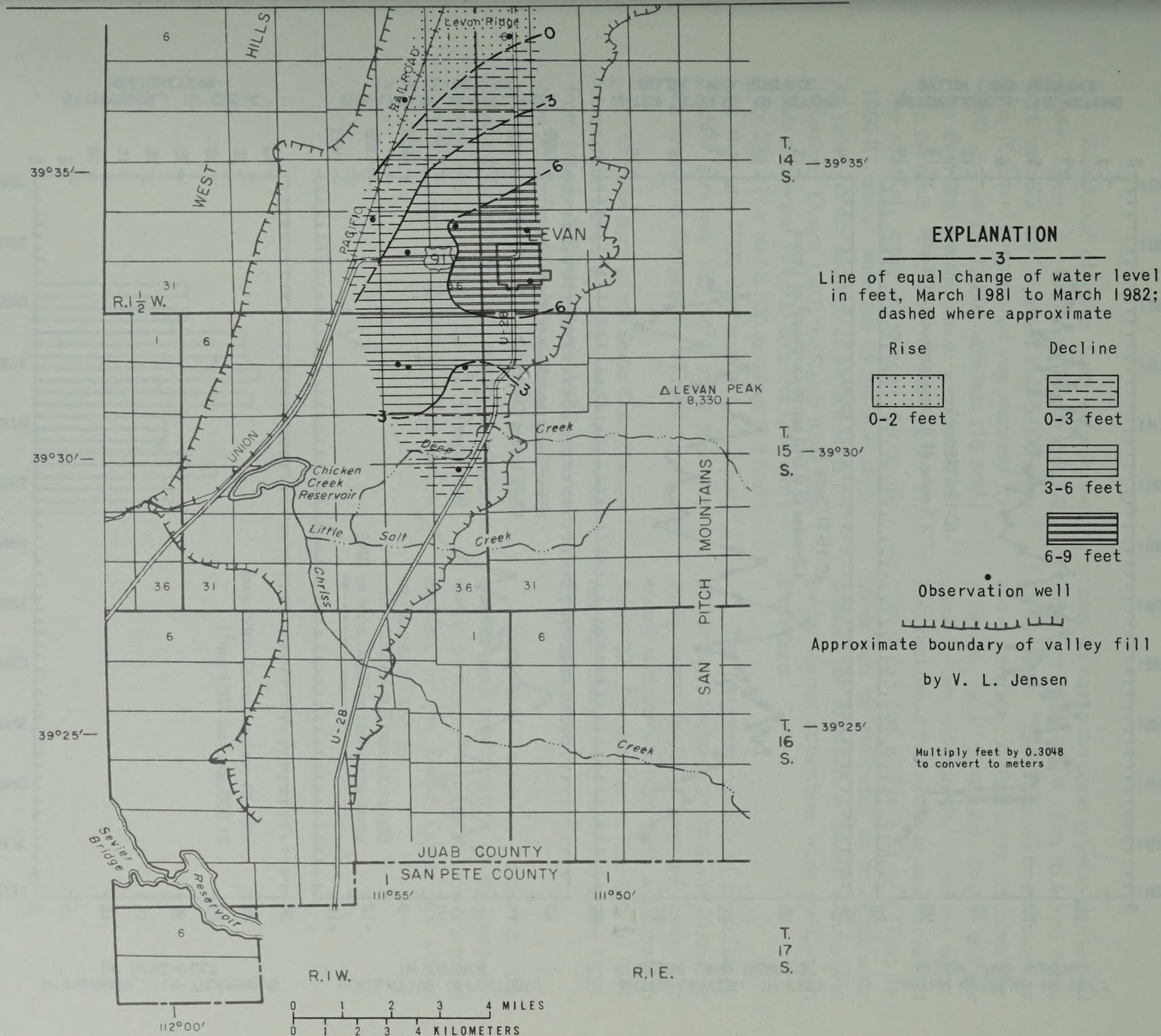


Figure 20.—Map of Juab Valley showing change of water levels from March 1981 to March 1982.

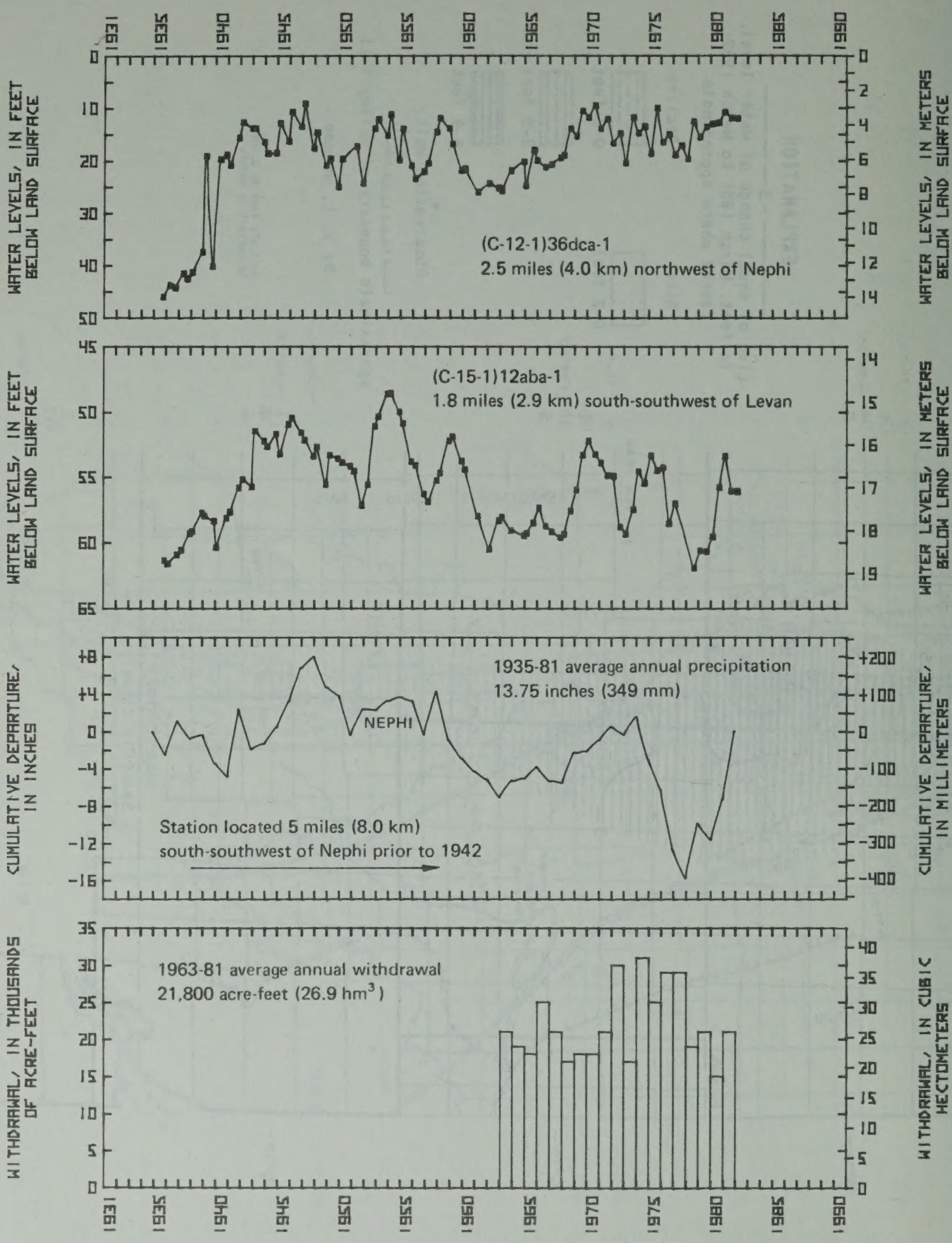


Figure 21.—Relation of water levels in selected wells in Juab Valley to cumulative departure from the average annual precipitation at Nephi and to annual withdrawals from wells.

SEVIER DESERT

by Michael Enright

Withdrawal of water from wells in the Sevier Desert in 1981 was about 18,000 acre-feet (22 hm^3), which was 5,000 acre-feet (6.2 hm^3) more than was reported for 1980 and about 13,000 acre-feet (16 hm^3) less than the average annual withdrawal for the previous 10 years, 1971-80 (table 2). The relatively small withdrawals during the 1980-81 period were due to the availability of above normal supplies of surface water for irrigation. During 1981, the Sevier River near Juab discharged 194,800 acre-feet (240 hm^3) (fig. 22). This was 5,100 acre-feet (6.3 hm^3) less than the 1980 discharge but still about 52,500 acre-feet (65 hm^3) more than the average annual discharge for 1935-81.

In those parts of the Sevier Desert where observation wells are located, water levels rose from March 1981 to March 1982 in more than 90 percent of both the upper and lower artesian aquifers (fig. 23 and 24). The largest observed water-level rise in the lower artesian aquifer was 3.37 feet (1.03 m), 3 miles (4.8 km) southwest of Lynndyl. The largest observed rise in the upper artesian aquifer was 3.54 feet (1.08 m), 4 miles (6.4 km) north of Oak City. These rises can be attributed to above average surface-water supplies for irrigation and continued below average ground-water withdrawals. Observed water-level declines in both artesian aquifers ranged from 1 to 6 feet (0.3 to 1.83 m). These declines can be attributed to localized withdrawals for irrigation or public supply, and below normal streamflow from the Canyon Mountains.

The long-term relation of precipitation at Oak City, discharge of the Sevier River near Juab, water levels in selected wells, and annual withdrawals from wells are shown in figure 22. Precipitation at Oak City in 1981 was 4.37 inches (111 mm) above the 1935-81 average annual.

Water-level contours depicting the altitude and configuration of the potentiometric surface in the upper and lower artesian aquifers in the Sevier Desert are shown in figures 25 and 26.

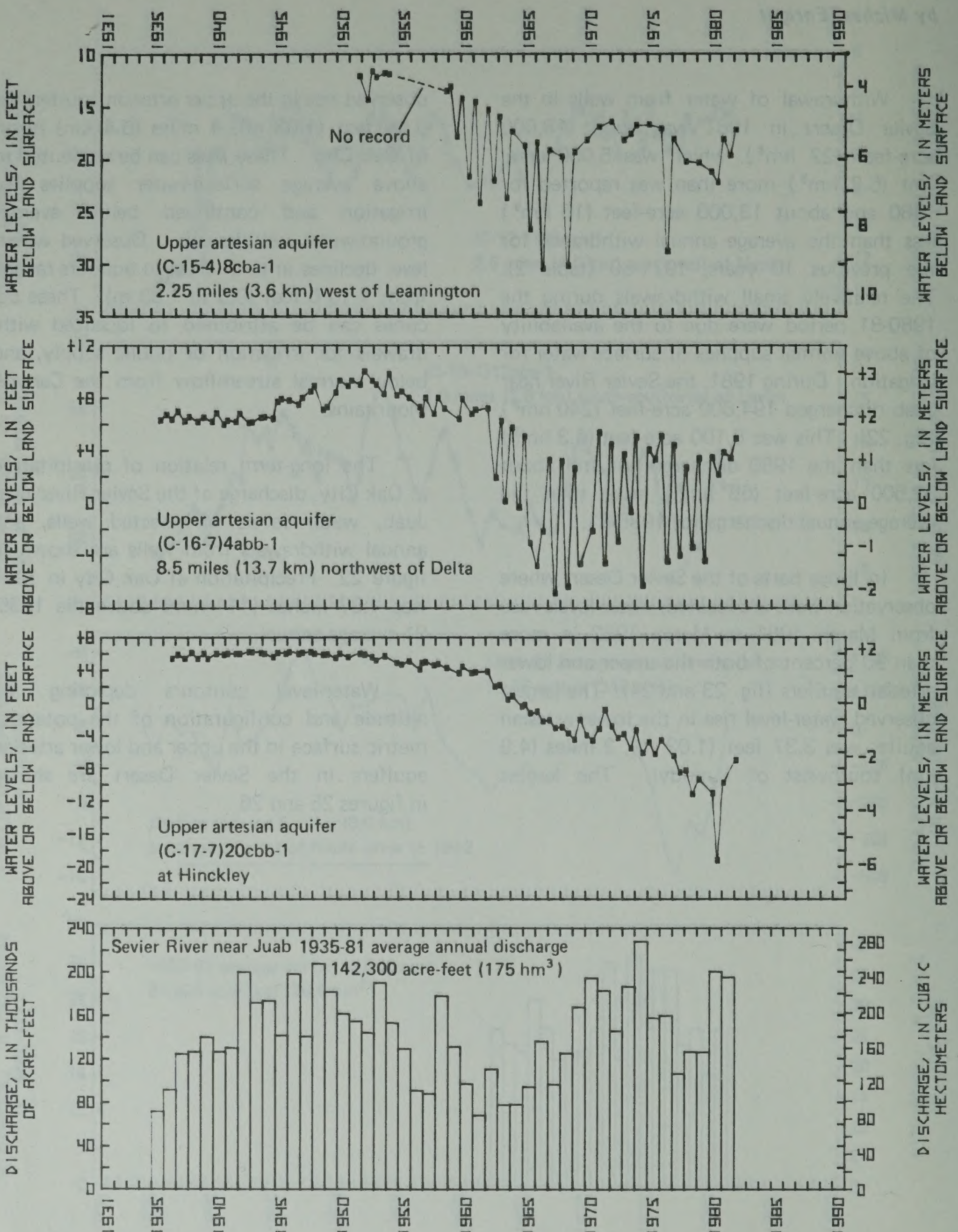


Figure 22.—Relation of water levels in selected wells in the Sevier Desert to discharge of the Sevier River near Juab, to cumulative departure from the average annual precipitation at Oak City, and to annual withdrawals from wells.

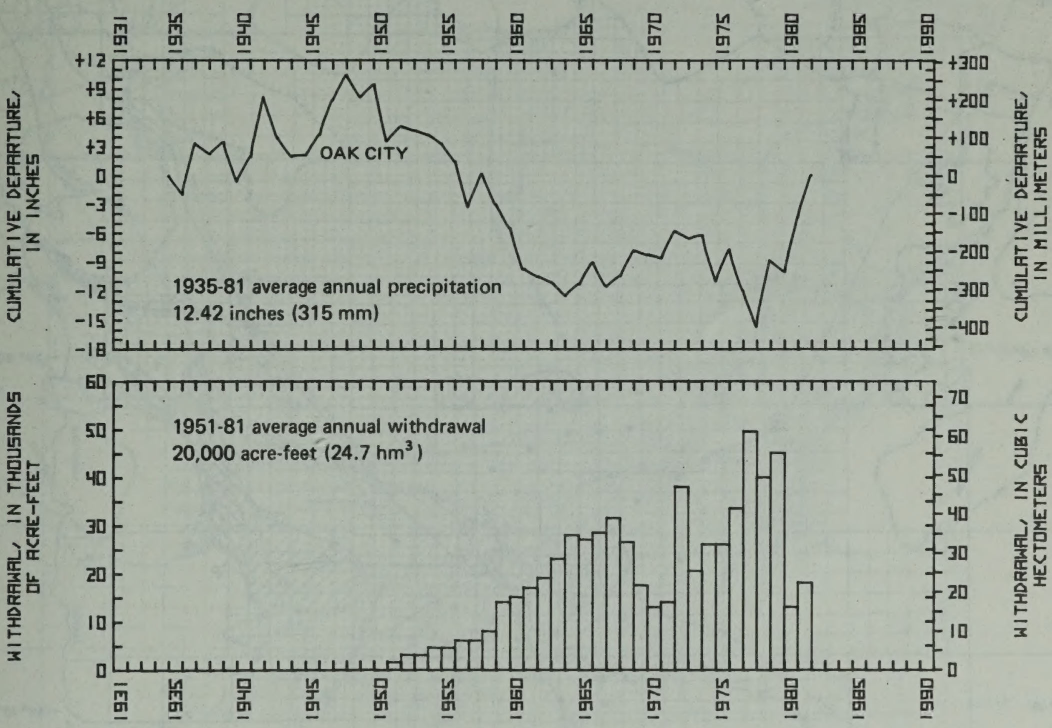


Figure 22.—Continued

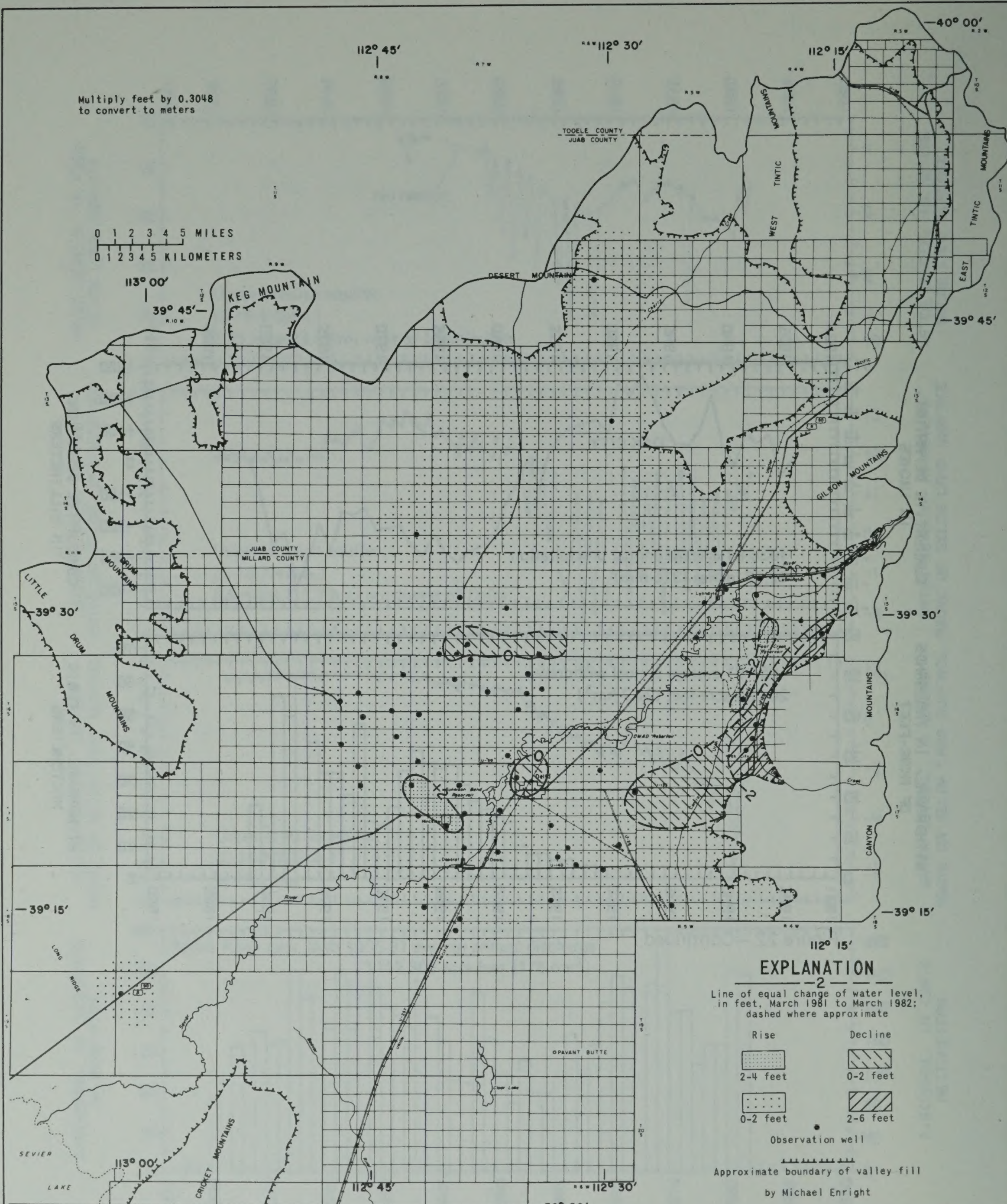


Figure 23.—Map of part of the Sevier Desert showing change of water levels in the upper artesian aquifer from March 1981 to March 1982.

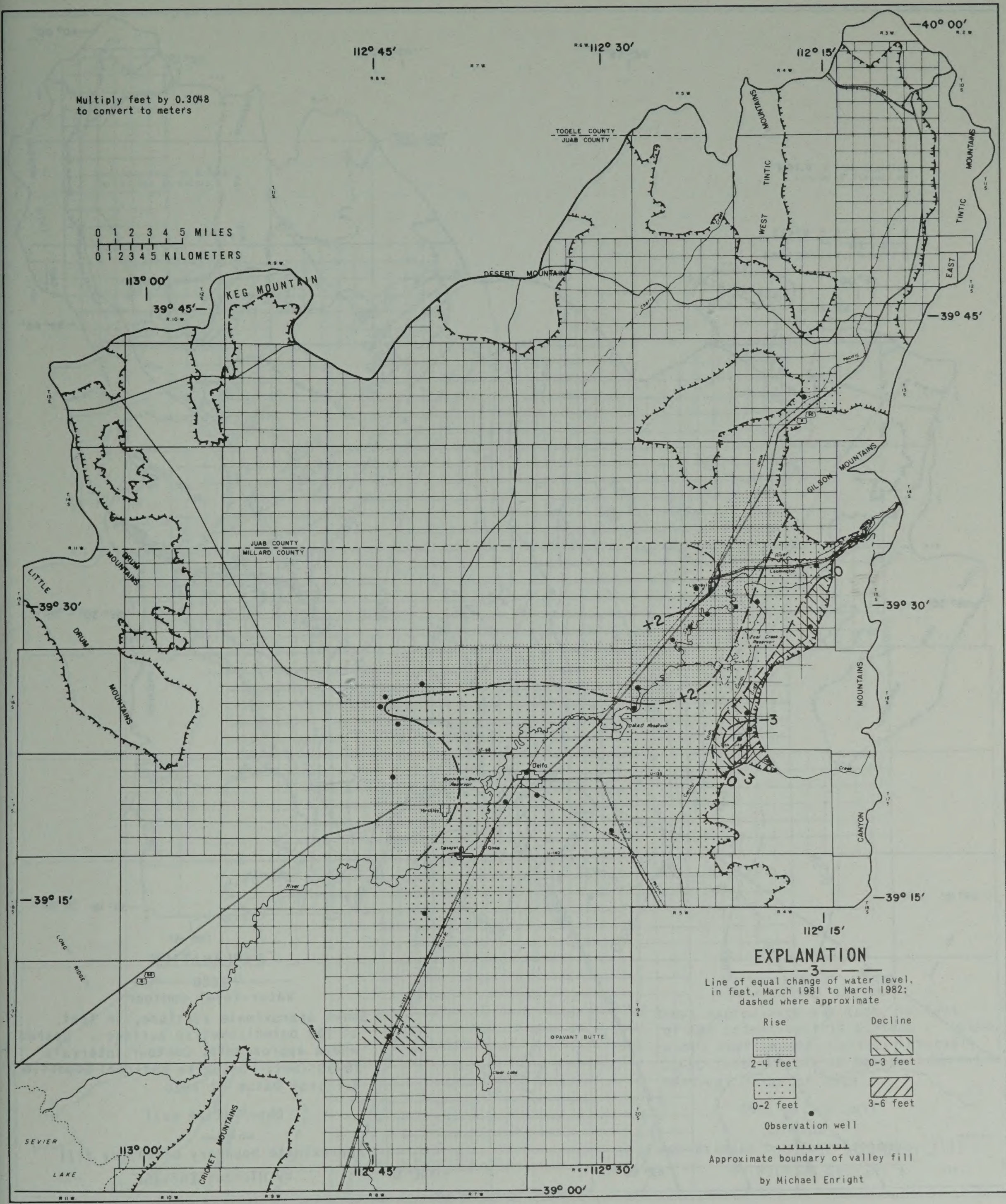


Figure 24.—Map of part of the Sevier Desert showing change of water levels in the lower artesian aquifer from March 1981 to March 1982.

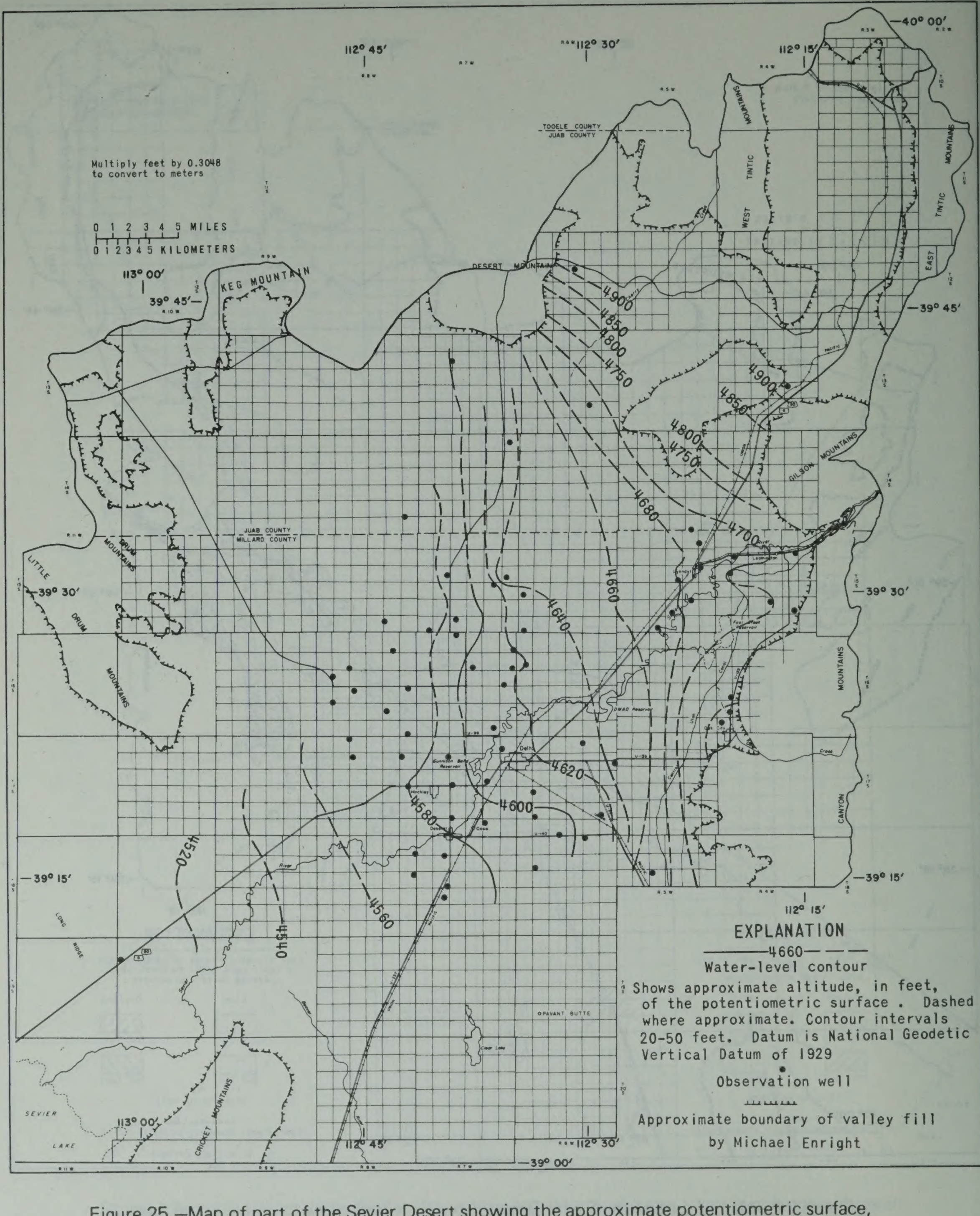


Figure 25.—Map of part of the Sevier Desert showing the approximate potentiometric surface, upper artesian aquifer, March 1982.

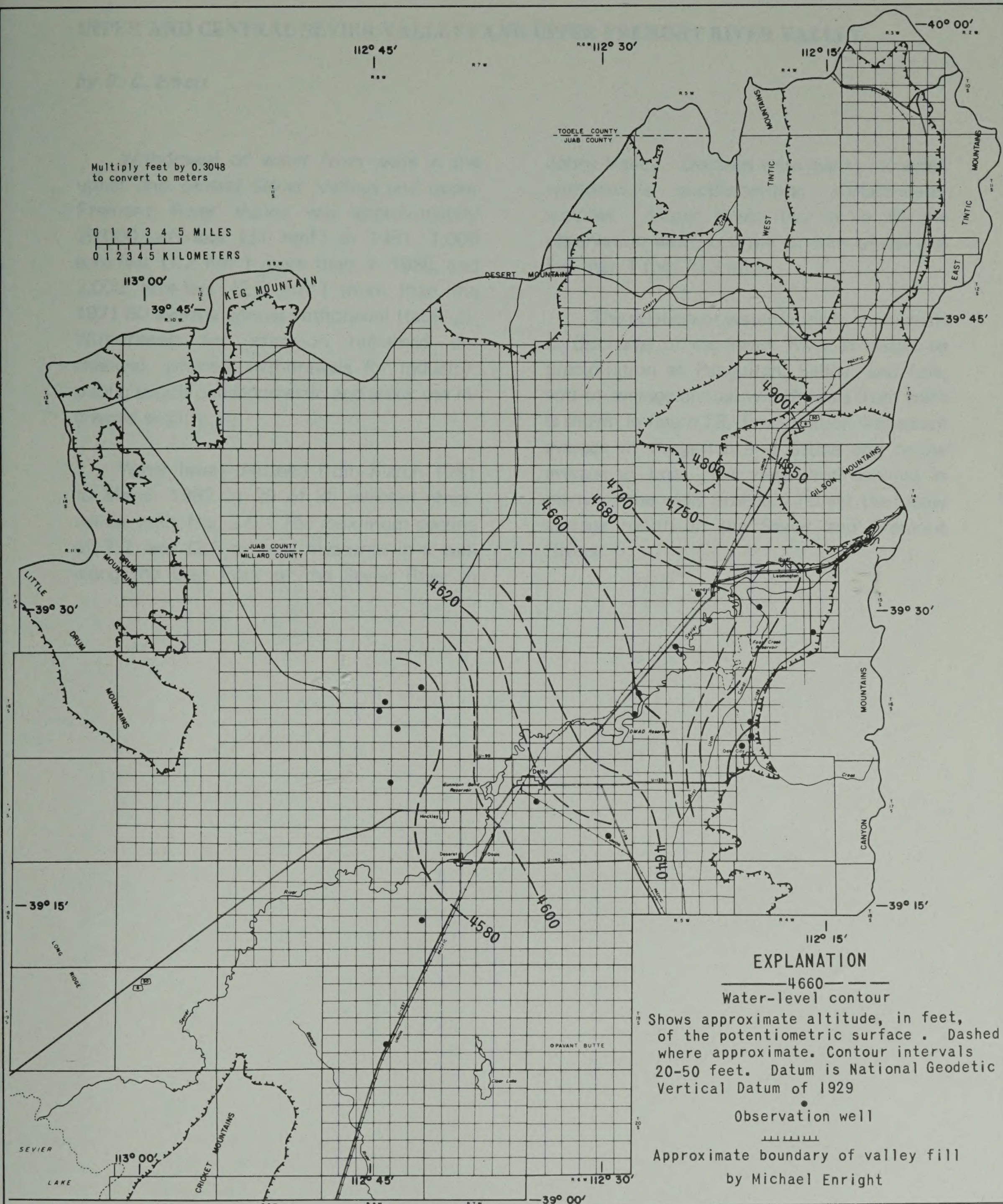


Figure 26.—Map of part of the Sevier Desert showing the approximate potentiometric surface, lower artesian aquifer, March 1982.

UPPER AND CENTRAL SEVIER VALLEYS AND UPPER FREMONT RIVER VALLEY

by D. C. Emett

Withdrawal of water from wells in the upper and central Sevier Valleys and upper Fremont River Valley was approximately 25,000 acre-feet (31 hm^3) in 1981, 1,000 acre-feet (1.2 hm^3) more than in 1980, and 2,000 acre-feet (2.5 hm^3) more than the 1971-80 average annual withdrawal (table 2). Withdrawals for irrigation remained unchanged, whereas withdrawals for industry, public supply, and domestic and stock use increased slightly.

Water levels declined from March 1981 to March 1982 in 20 of 30 selected observation wells (fig. 27). The maximum decline of 7.2 feet (2.2 m) was measured in a well along the East Fork of the Sevier River in Johns Valley. Declines were due to increased withdrawals supplementing surface-water supplies. Water levels rose in six of the observation wells, but the amount of rise was less than 1 foot (0.3 m).

The relation of water levels in three wells to discharge of the Sevier River at Hatch, to precipitation at Panguitch, Salina, and Loa, and to average annual withdrawals from wells is shown in figure 28. Precipitation was above average at Panguitch and Salina and below average at Loa. The water-level declines in many of the wells probably reflect the below average runoff in the Sevier and Fremont Rivers.

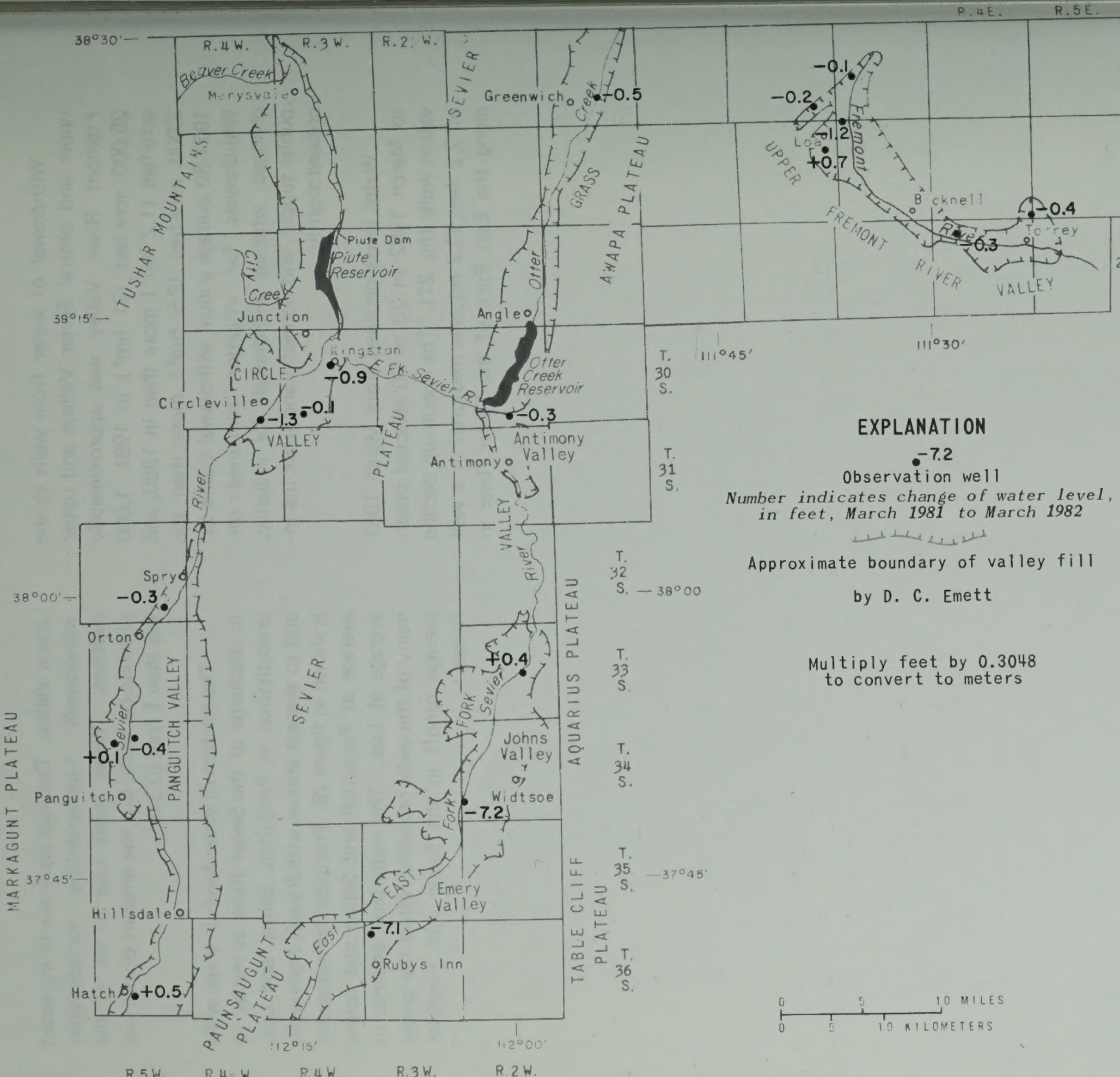
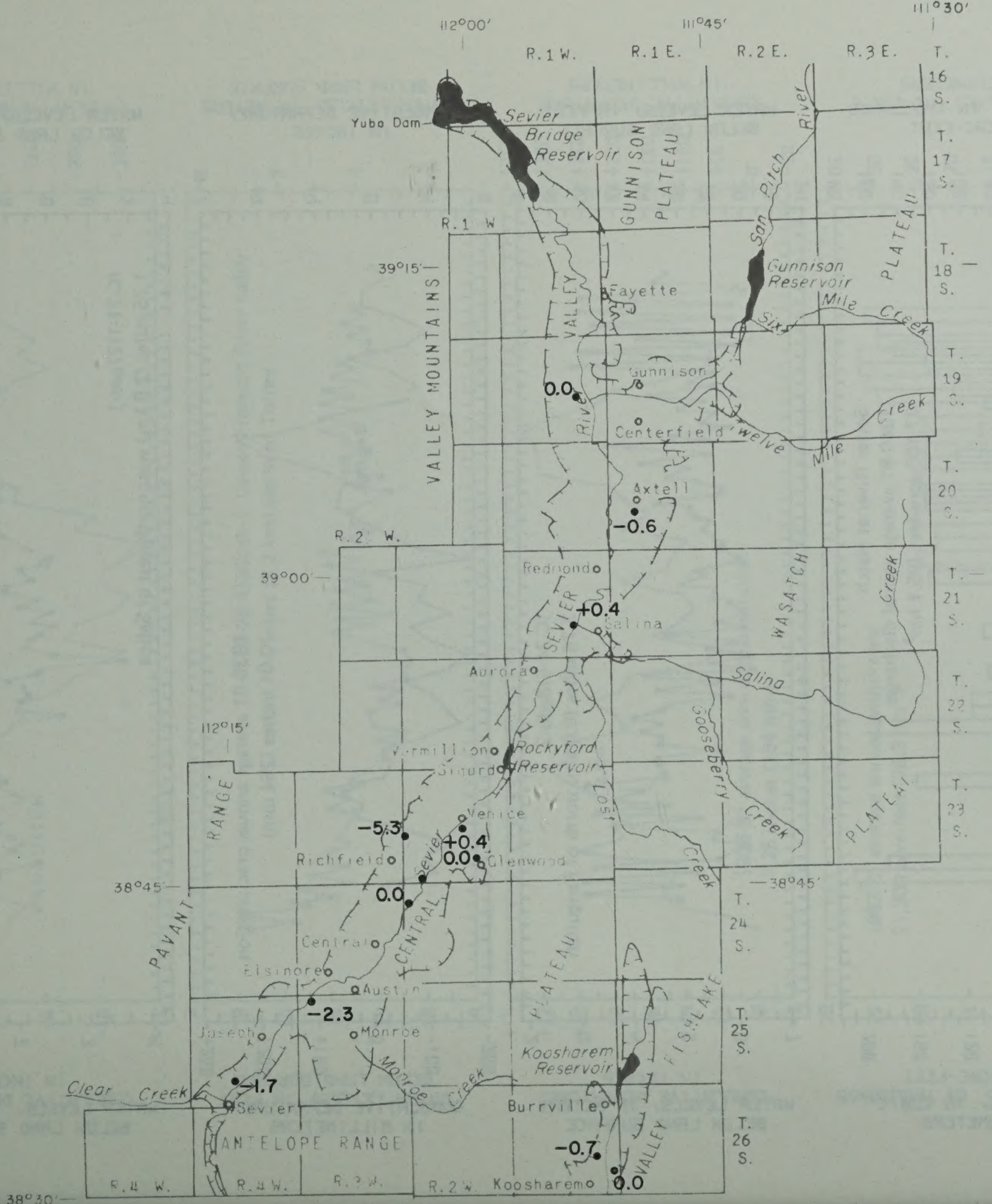


Figure 27.—Map of the upper and central Sevier Valleys and upper Fremont River valley showing change of water levels from March 1981 to March 1982.


112°00′
111°45′
111°30′
R.1 W.
R.1 E.
R.2 E.
R.3 E.
T. 16 S.
T. 17 S.
T. 18 S.
T. 19 S.
T. 20 S.
T. 21 S.
T. 22 S.
T. 23 S.
T. 24 S.
T. 25 S.
T. 26 S.
Yuba Dam
Sevier Bridge Reservoir
GUNNISON PLATEAU
San Pitch River
Gunnison Reservoir
PLATEAU
Six Mile Creek
R.1 W
39°15′
VALLEY MOUNTAINS
VALLEY
Fayette
Gunnison
0.0
River
Centerfield
Twelve Mile Creek
Axtell
−0.6
R.2 W.
39°00′
Redmondo
SEVIER
+0.4
Salina
WASATCH
Creek
Aurora
Salina
Gooseberry
Creek
112°15′
Vermillion
Rockyford Reservoir
Sigurd
RANGE
Lost
Venice
−5.3
+0.4
0.0
Glenwood
Richfield
Sevier
PLATEAU
38°45′
0.0
CENTRAL
Creek
38°45′
PAVANT
Central
PLATEAU
Elsinore
Austin
FISH LAKE
−2.3
Joseph
Monroe
Koosharem Reservoir
Clear Creek
−1.7
Monroe Creek
Sevier
Burrville
ANTELOPE RANGE
−0.7
VALLEY
R.4 W.
R.4 W.
R.3 W.
R.2 W.
Koosharem
0.0
38°30′

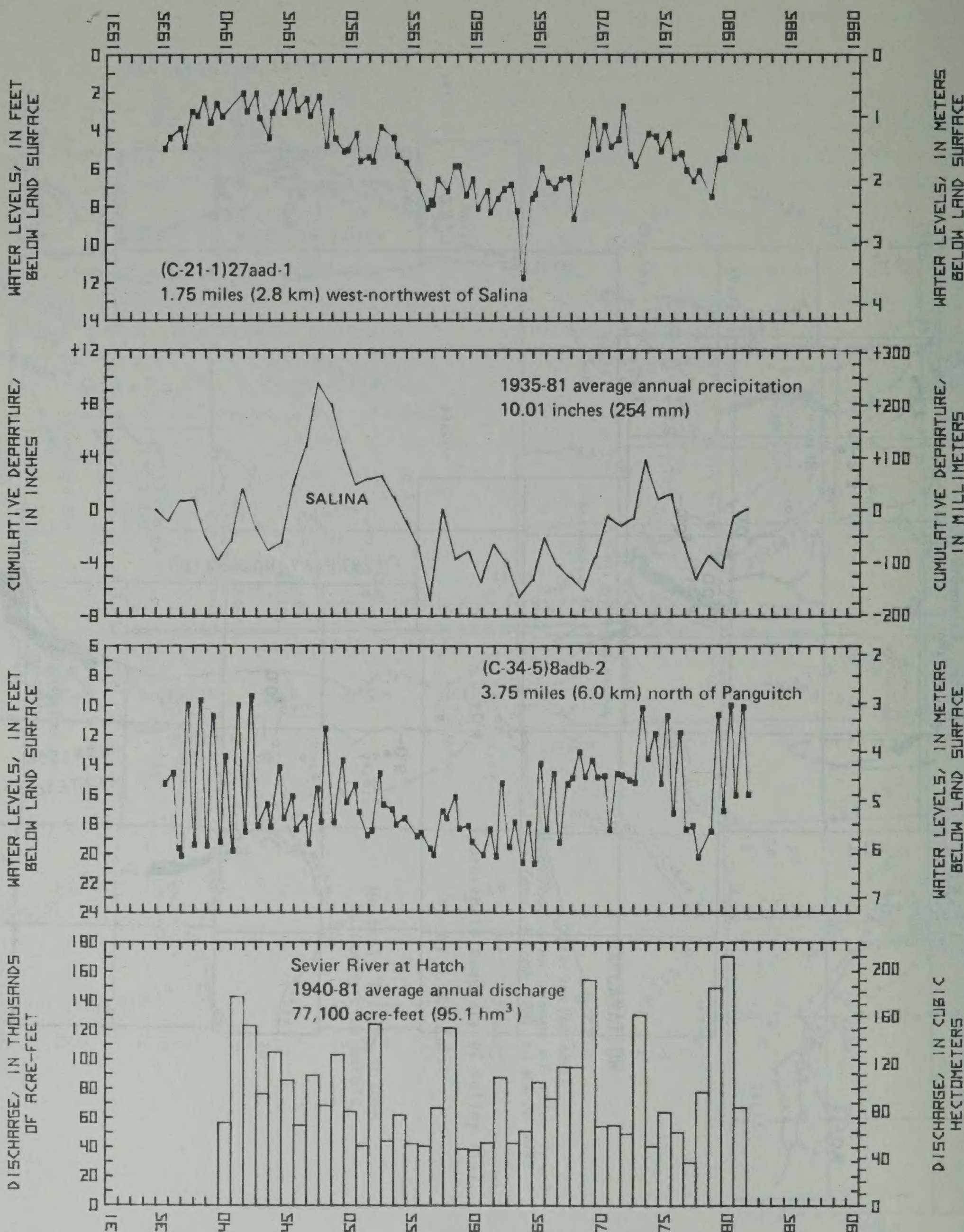


Figure 28.--Relation of water levels in selected wells to discharge of the Sevier River at Hatch, to cumulative departure from average annual precipitation at selected climate stations, and to annual withdrawals from wells—upper and central Sevier Valleys and upper Fremont River valley.

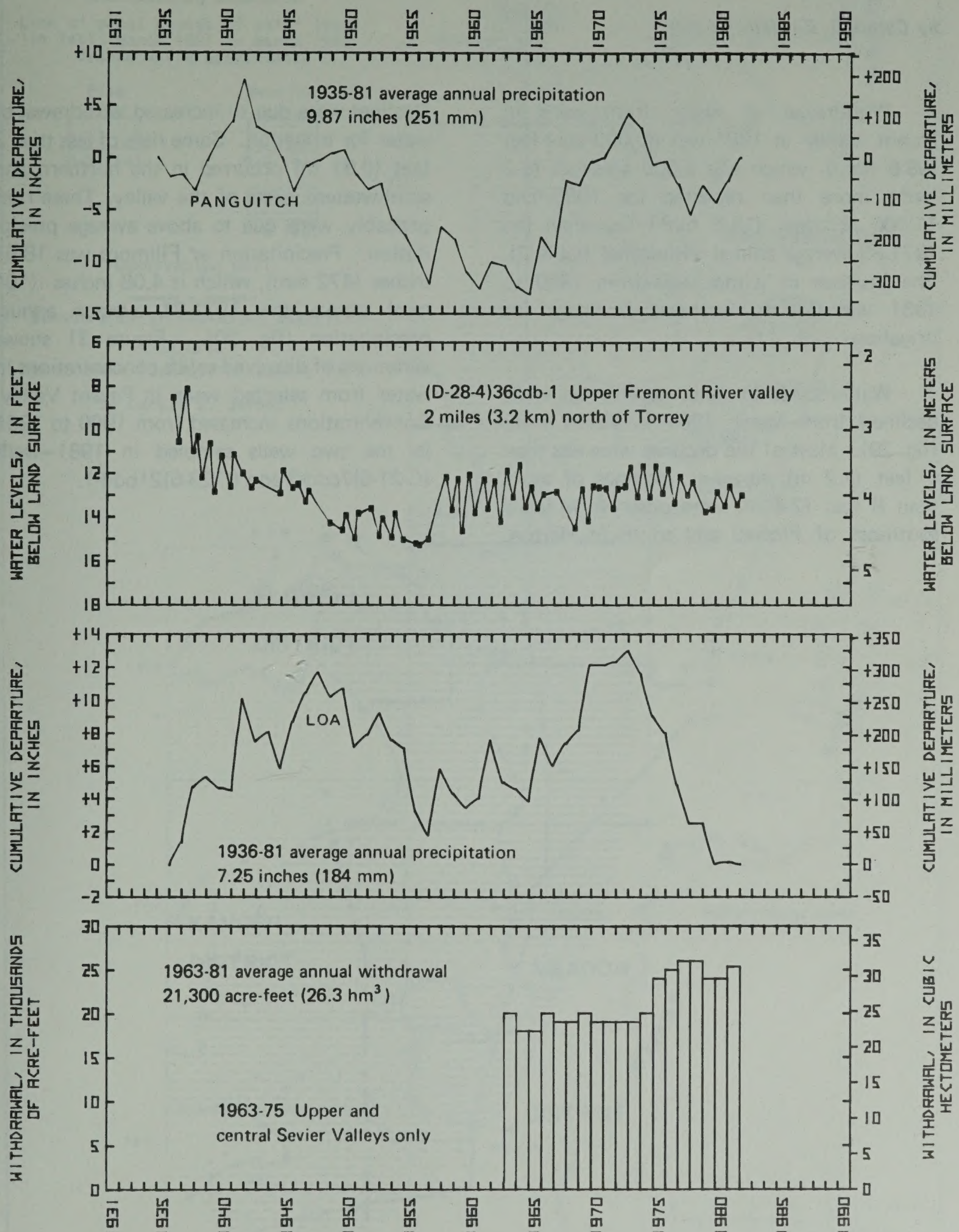


Figure 28.—Continued

PAVANT VALLEY

by Carole B. Burden

Withdrawal of water from wells in Pavant Valley in 1981 was 80,000 acre-feet (98.6 hm^3), which was 5,000 acre-feet (6.2 hm^3) more than reported for 1980 and 11,000 acre-feet (13.6 hm^3) less than the 1971-80 average annual withdrawal (table 2). The increase in withdrawals from 1980 to 1981 was due to increased pumpage for irrigation.

Water levels in most observation wells declined from March 1981 to March 1982 (fig. 29). Most of the declines were less than 4 feet (1.2 m); however, declines of more than 8 feet (2.4 m) were observed in wells southeast of Flowell and south of Hatton. Declines were due to increased withdrawal of water for irrigation. Some rises of less than 3 feet (0.91 m) occurred in the northern and southwestern parts of the valley. These rises probably were due to above average precipitation. Precipitation at Fillmore was 18.57 inches (472 mm), which is 4.08 inches (104 mm) above the 1931-81 average annual precipitation (fig. 30). Figure 31 shows variations of dissolved-solids concentrations in water from selected wells in Pavant Valley. Concentrations increased from 1980 to 1981 in the two wells sampled in 1981—wells (C-21-5)7cdd-3 and (C-23-6)21bdd-1.

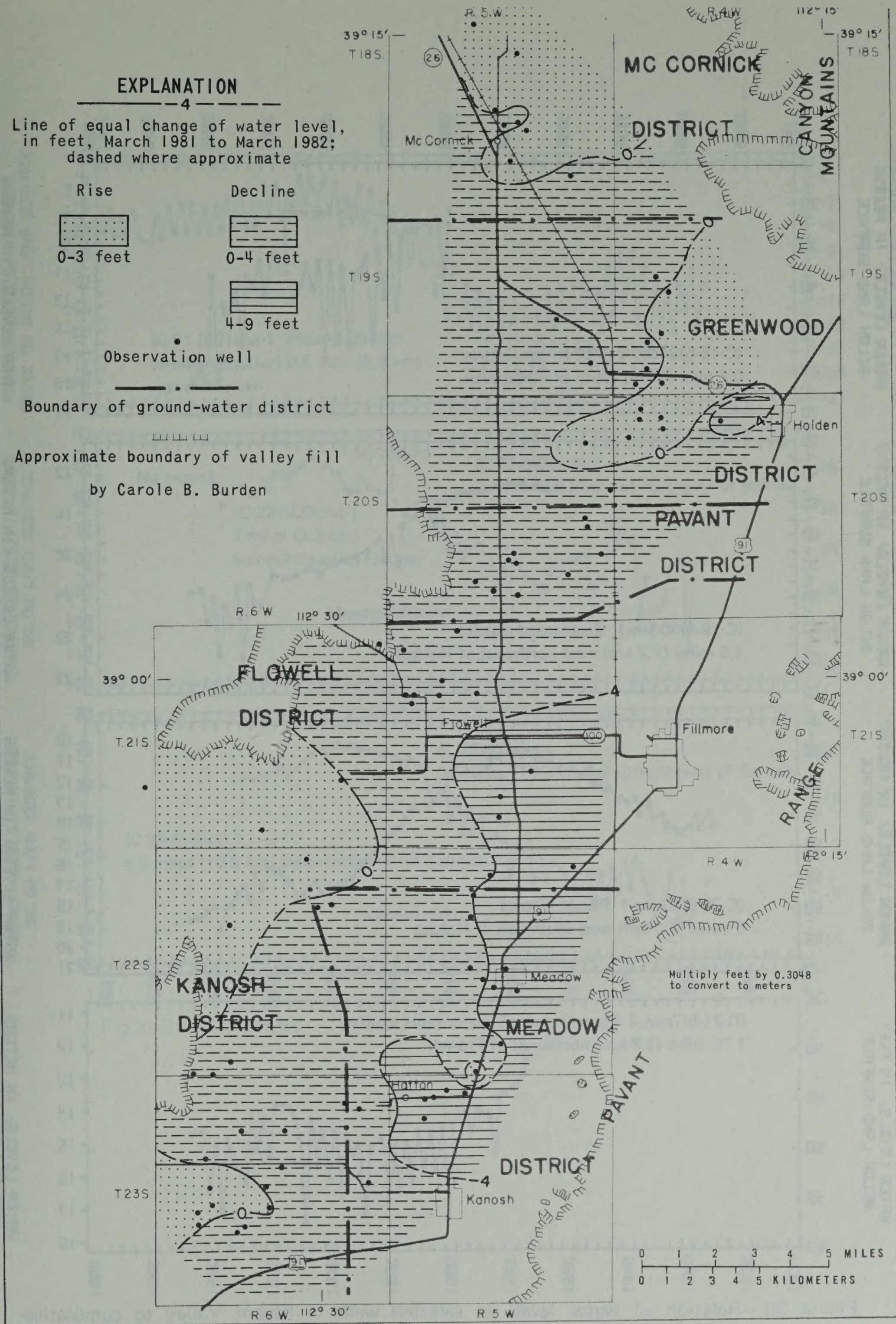


Figure 29.—Map of Pavant Valley showing change of water levels from March 1981 to March 1982.

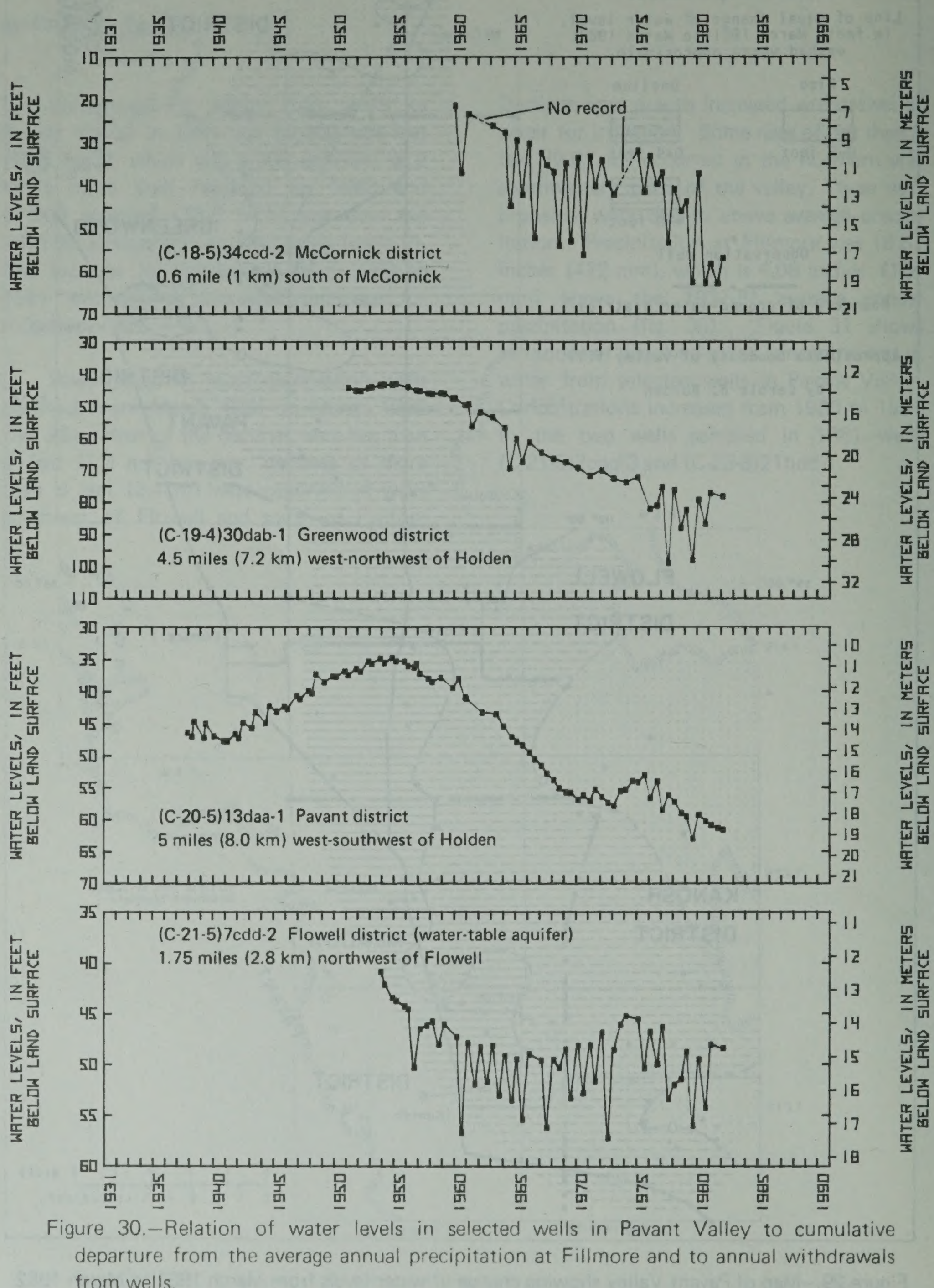


Figure 30.—Relation of water levels in selected wells in Pavant Valley to cumulative departure from the average annual precipitation at Fillmore and to annual withdrawals from wells.

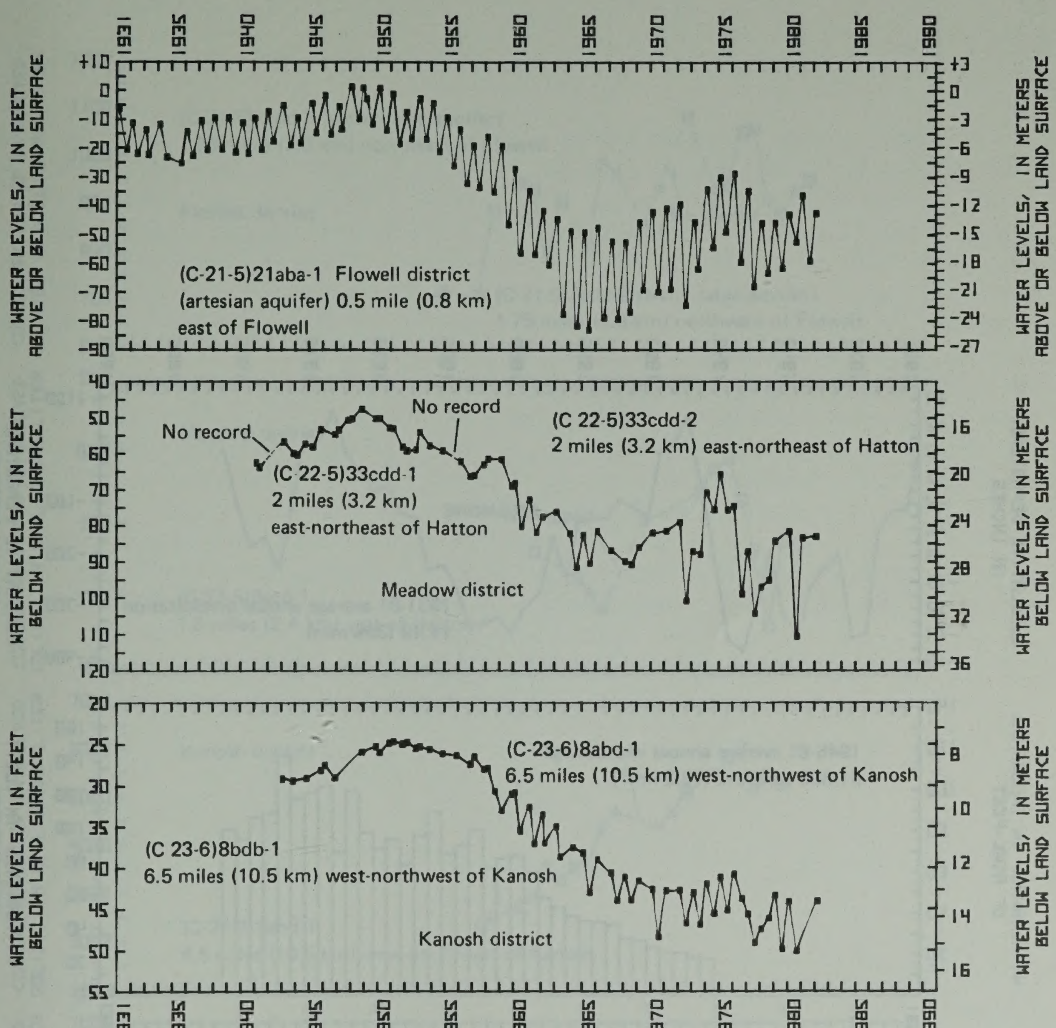


Figure 30.—Continued

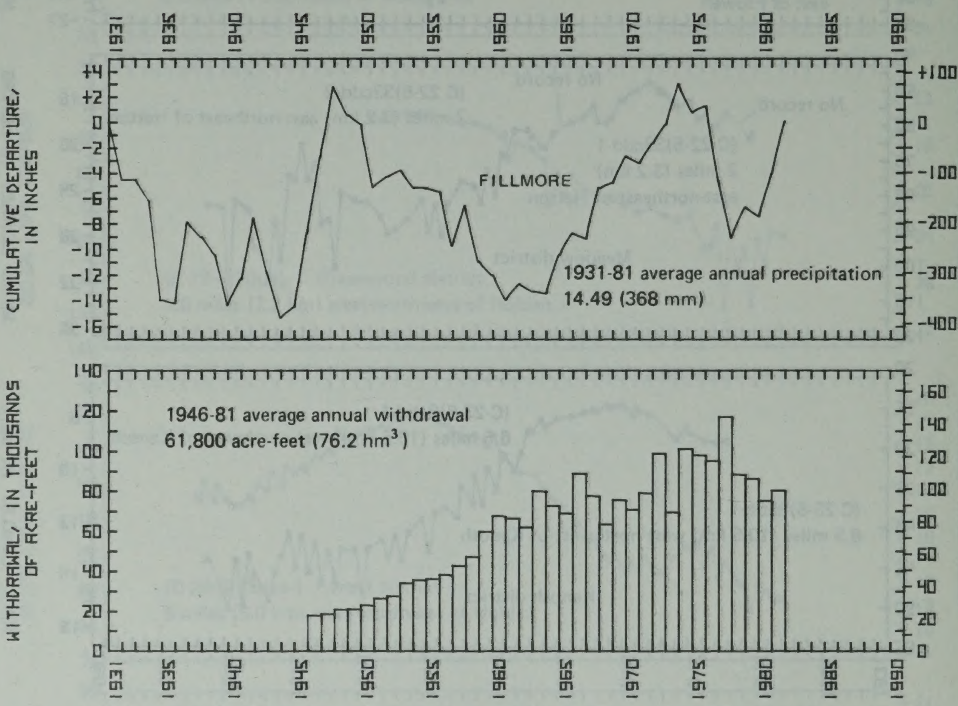


Figure 30.—Continued

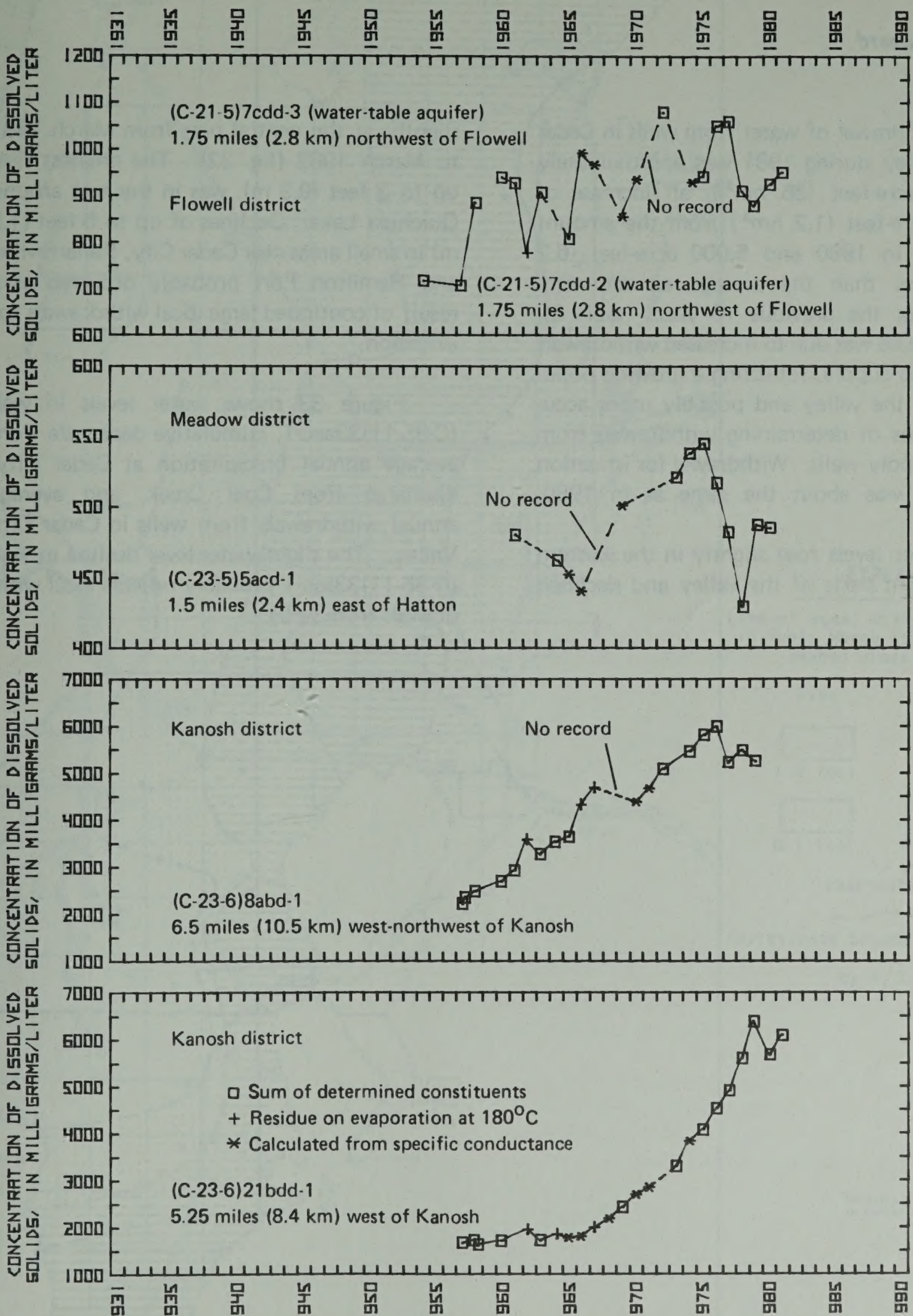


Figure 31.—Concentration of dissolved solids in water from selected wells in Pavant Valley.

CEDAR CITY VALLEY

by R. C. Beard

Withdrawal of water from wells in Cedar City Valley during 1981 was approximately 29,000 acre-feet (36 hm^3), an increase of 1,000 acre-feet (1.2 hm^3) from the amount reported in 1980 and 5,000 acre-feet (6.2 hm^3) less than the average annual withdrawal for the previous 10 years (table 2). The increase was due to increased withdrawals for public supply, reflecting a growing population in the valley and possibly more accurate means of determining withdrawals from public-supply wells. Withdrawal for irrigation in 1981 was about the same as in 1980.

Water levels rose slightly in the western and eastern parts of the valley and declined slightly in the central part from March 1981 to March 1982 (fig. 32). The greatest rise, up to 3 feet (0.9 m), was in the area around Quichipa Lake. Declines of up to 5 feet (1.5 m) in small areas near Cedar City, Kanarraville, and Hamilton Fort probably occurred as a result of continued large local withdrawals for irrigation.

Figure 33 shows water levels in well (C-35-11)33aac-1, cumulative departure from average annual precipitation at Cedar City, discharge from Coal Creek, and average annual withdrawals from wells in Cedar City Valley. The slight water-level decline in well (C-35-11)33aac-1 probably reflects local withdrawals from wells.

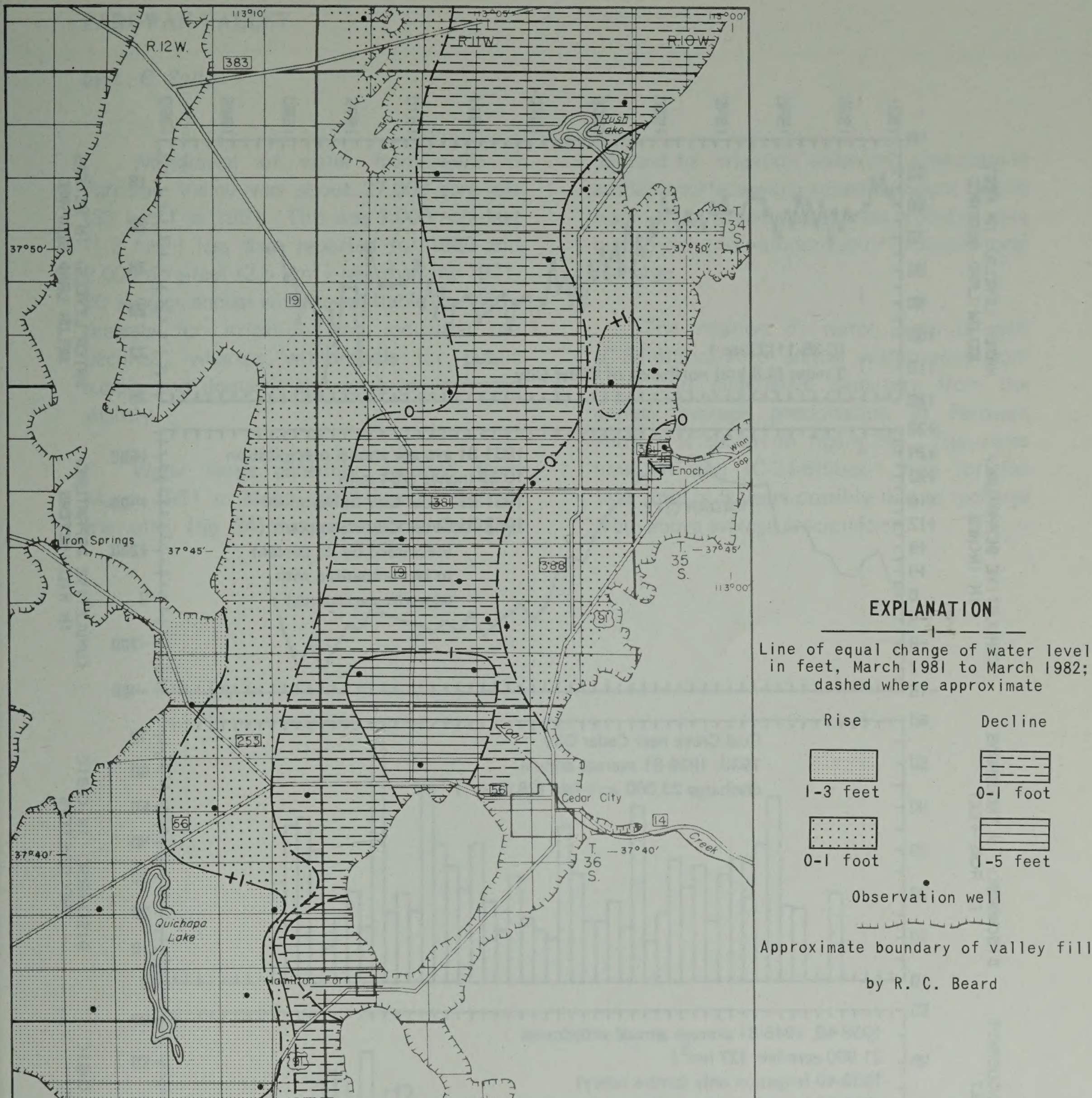


Figure 32.—Map of Cedar City Valley showing change of water levels from March 1981 to March 1982.

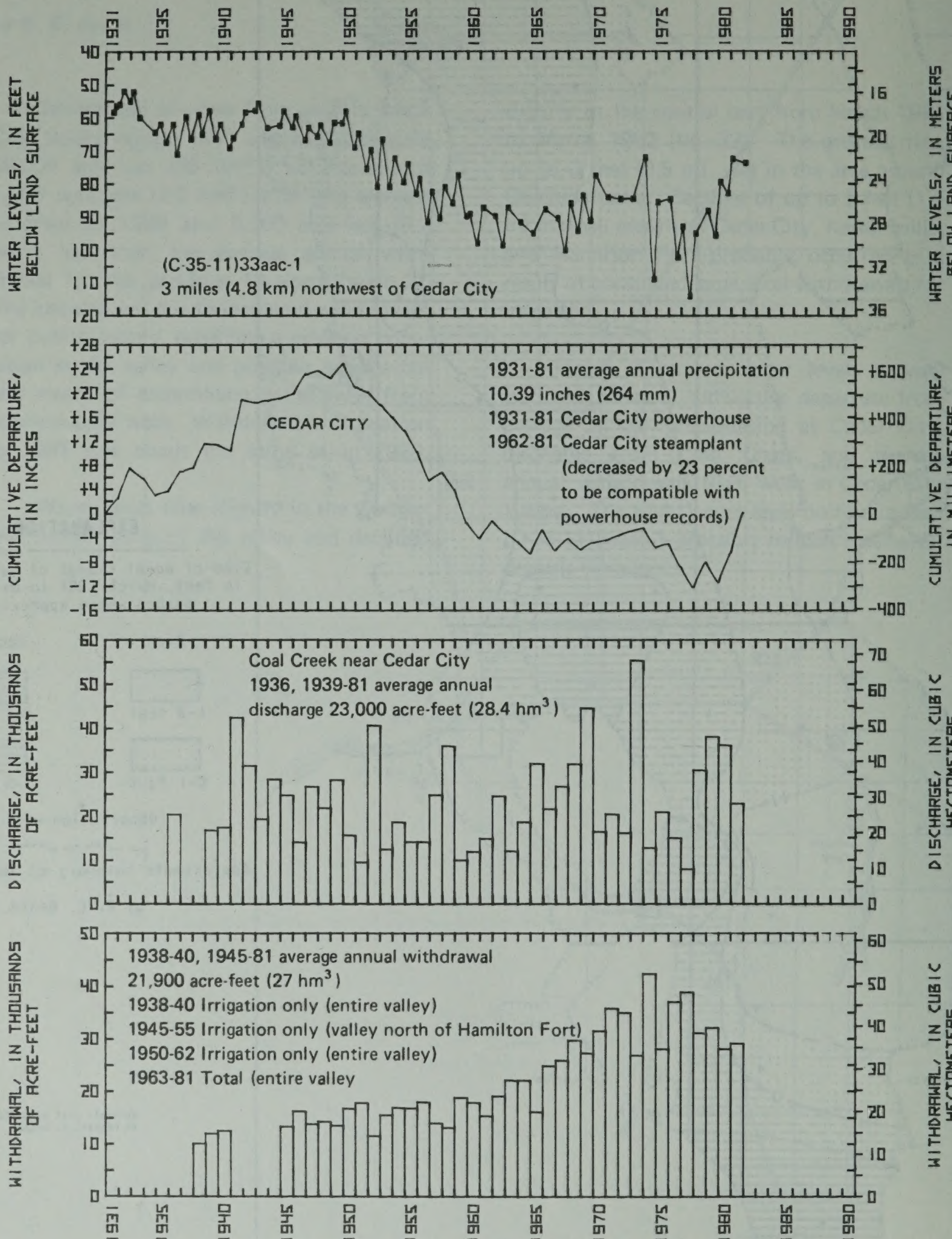


Figure 33.—Relation of water levels in well (C-35-11)33aac-1 in Cedar City Valley to cumulative departure from the average annual precipitation at the Cedar City powerhouse to discharge of Coal Creek near Cedar City, and to annual withdrawals from wells.

PAROWAN VALLEY

by L. G. Sultz

Withdrawal of water from wells in Parowan Valley was about 27,000 acre-feet (33 hm^3) in 1981. This was 1,000 acre-feet (1.2 hm^3) less than reported for 1980 and 2,000 acre-feet (2.5 hm^3) less than the 1971-80 average annual withdrawal (table 2). Withdrawals for irrigation and industrial use declined, whereas withdrawals for public supply and domestic and stock use increased slightly.

Water levels generally declined from March 1981 to March 1982 in most parts of the valley (fig. 34) due to the continued large demand for irrigation water and a decrease in available surface-water supplies. Slight rises in water levels in some local areas probably were due to reduced withdrawals or increased local recharge.

The relation of water levels in well (C-34-8)5bca-1 to annual withdrawals from wells and cumulative departure from the annual average precipitation at Parowan Airport is shown in figure 35. The water level in well (C-34-8)5bca-1 rose for the first time in 8 years possibly due to recharge from above average precipitation.

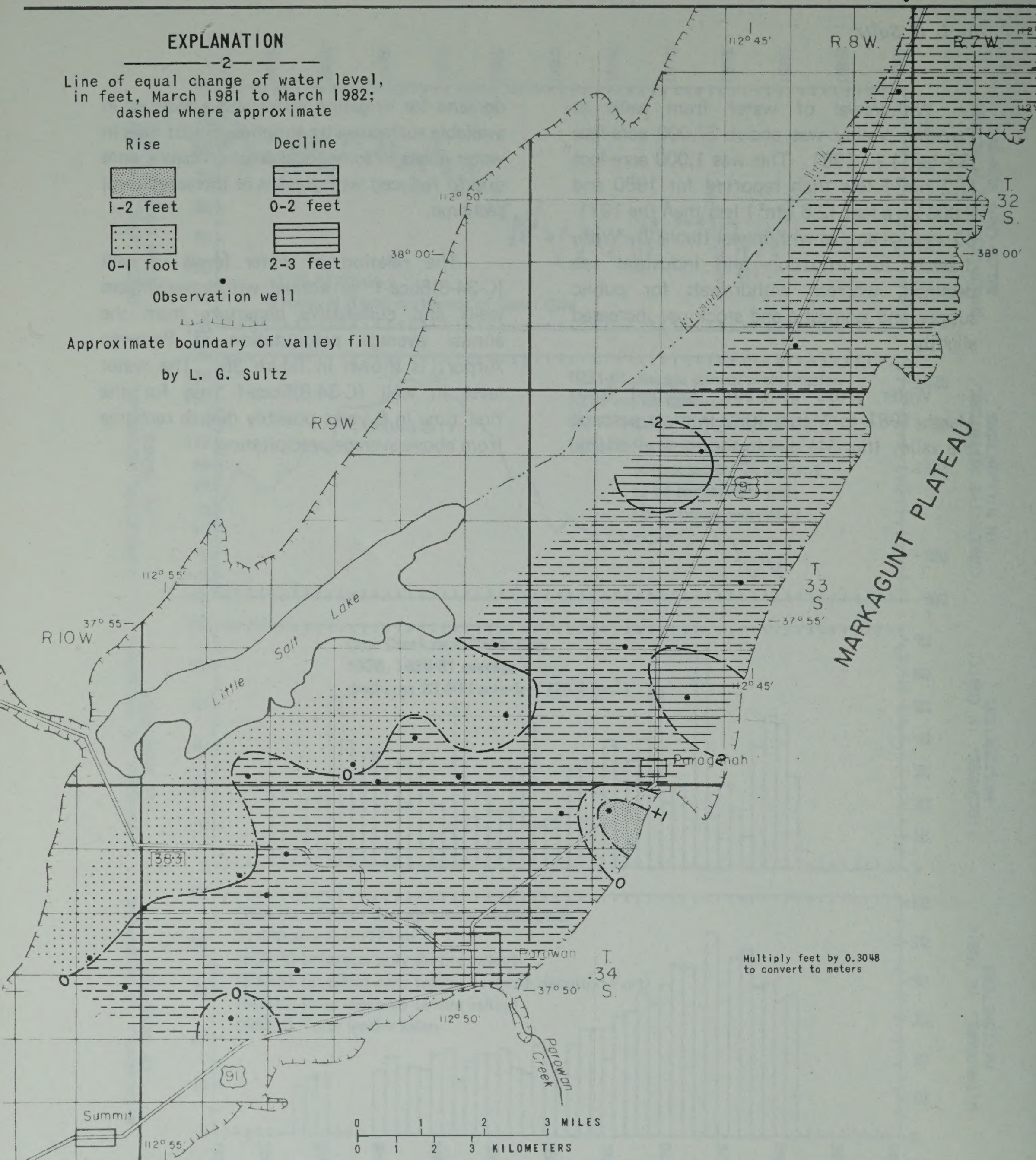


Figure 34.—Map of Parowan Valley showing change of water levels from March 1981 to March 1982.

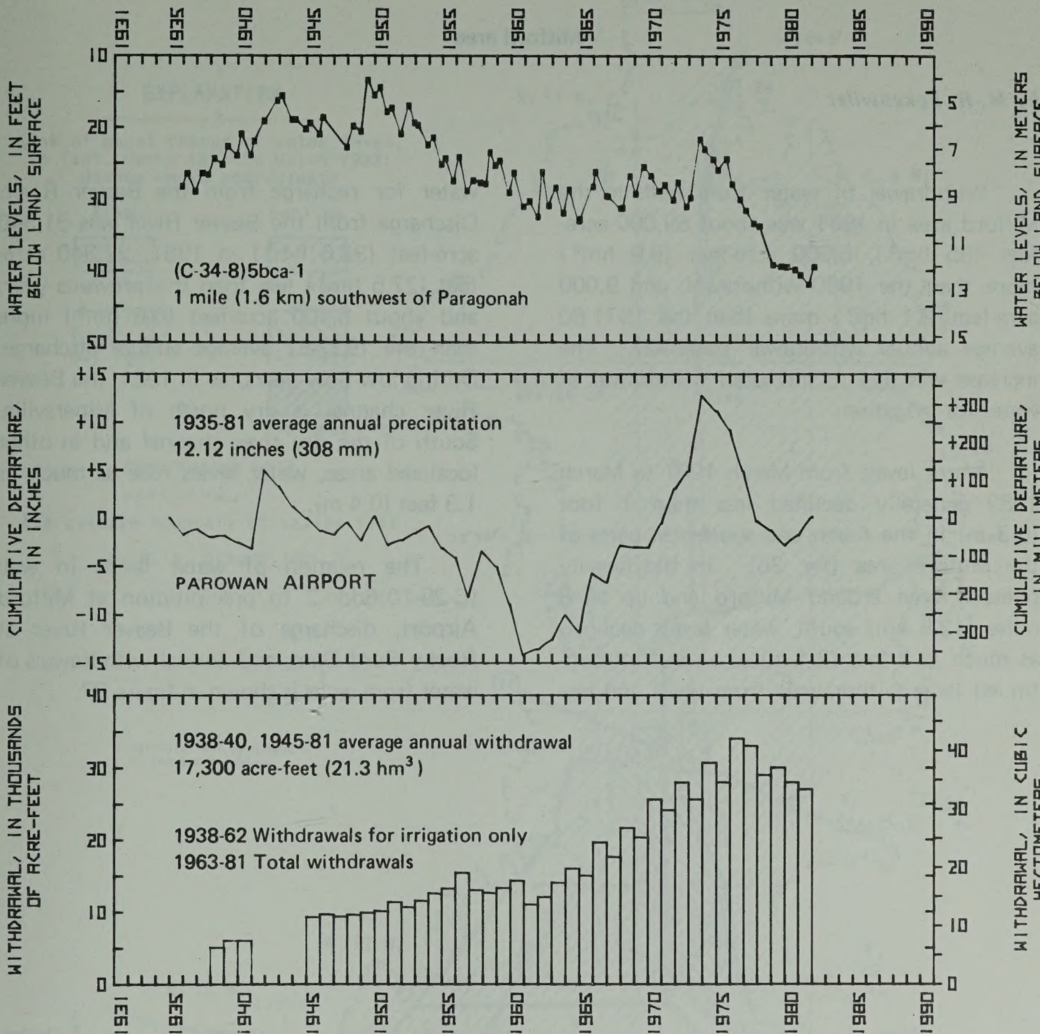


Figure 35.—Relation of water levels in well (C-34-8)5bca-1 in Parowan Valley to cumulative departure from the average annual precipitation at Parowan Airport and to annual withdrawals from wells.

Milford area

by M. R. Eckenwiler

Withdrawal of water from wells in the Milford area in 1981 was about 69,000 acre-feet (85 hm^3), 8,000 acre-feet (9.9 hm^3) more than the 1980 withdrawal, and 9,000 acre-feet (11 hm^3) more than the 1971-80 average annual withdrawal (table 2). The increase was due to increased withdrawal of water for irrigation.

Water levels from March 1981 to March 1982 generally declined less than 1 foot (0.3 m) in the north and southwest parts of the Milford area (fig. 36). In the heavily pumped area around Milford and up to 8 miles (12.8 km) south, water levels declined as much as 8 feet (2.4 m) as a result of continued large withdrawals from wells and less water for recharge from the Beaver River. Discharge from the Beaver River was 31,340 acre-feet (38.6 hm^3) in 1981, 22,340 acre-feet (27.5 hm^3) less than the previous year, and about 5,400 acre-feet (6.6 hm^3) more than the 1932-81 average annual discharge. During low-flow years, as in 1981, the Beaver River channel is dry north of Minersville. South of the dry river channel and in other localized areas, water levels rose as much as 1.3 feet (0.4 m).

The relation of water levels in well (C-29-10)6ddc-2 to precipitation at Milford Airport, discharge of the Beaver River at Rocky Ford Dam, and annual withdrawals of water from wells is shown in figure 37.

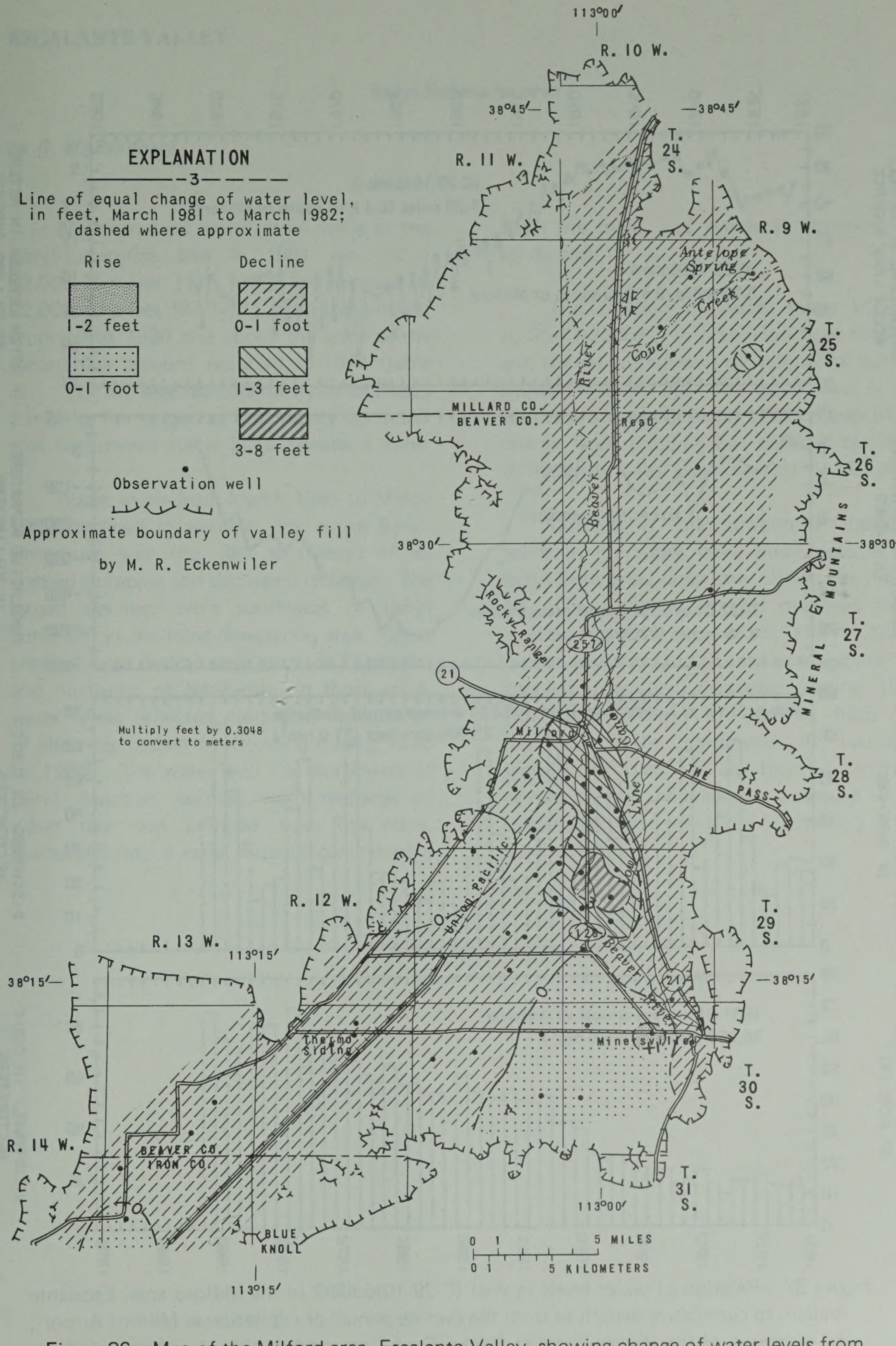


Figure 36.—Map of the Milford area, Escalante Valley, showing change of water levels from March 1981 to March 1982.

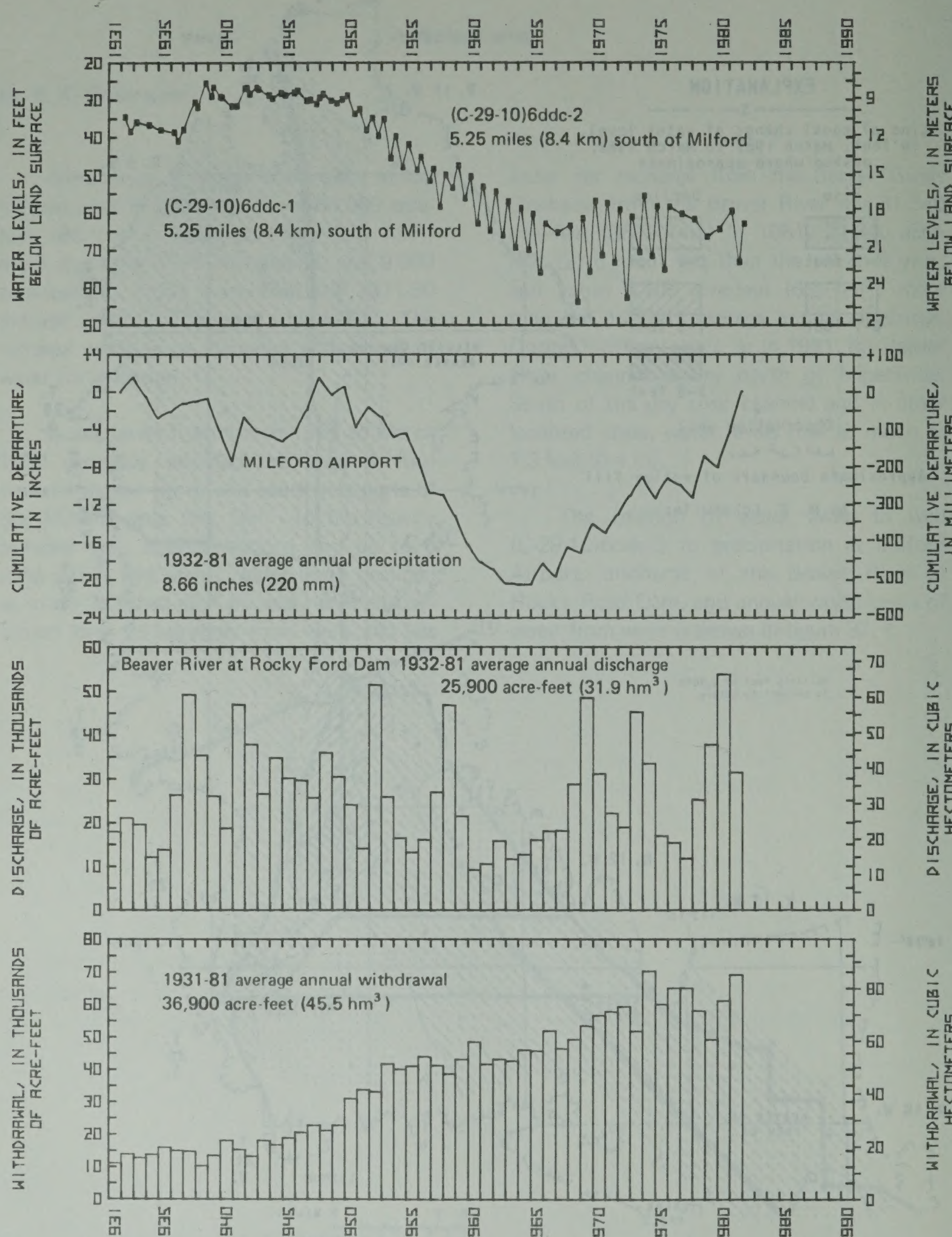


Figure 37.—Relation of water levels in well (C-29-10)6ddc-2 in the Milford area, Escalante Valley, to cumulative departure from the average annual precipitation at Milford Airport, to discharge of the Beaver River at Rocky Ford Dam, and to annual withdrawals from wells.

ESCALANTE VALLEY

Beryl-Enterprise area

by G. W. Sandberg

Withdrawal of water from wells in the Beryl-Enterprise area in 1981 was about 93,000 acre-feet (115 hm^3), an increase of 22,000 acre-feet (27 hm^3) from the amount reported in 1980 and about the same as the record-high amount reported in 1974 (table 3). The increase was due partly to increased pumping for irrigation but mostly to industrial withdrawal (table 2) to dewater a mine.

Water levels from March 1981 to March 1982 declined in virtually the entire Beryl-Enterprise area (fig. 38) as a result of increased pumping and decreased recharge. The largest declines were southwest of Beryl Junction, in the mine-dewatering area. Other areas of large decline were north of Enterprise and northeast of Newcastle; in those areas, water levels reflected continued attenuation of the rises caused by flooding during 1978 to 1980. The water-level rise northwest of Beryl Junction resulted from recharge of water that was pumped from the mine, discharged into a canal extending northward from the mine, and eventually spread on a sandy area.

The relation of water levels in well (C-35-17)25dcd-1 to precipitation at Modena and annual withdrawals of water from wells is shown in figure 39. The water level in the well rose during 1979 and 1980 because of recharge from flooding but declined by 1982 to the lowest level ever recorded for March.

Changes in concentration of dissolved solids in the water from three wells in the Beryl-Enterprise area are shown in figure 40. The concentration of dissolved solids increased sharply in well (C-37-17)12bdc-1 in the southern part of the area, where the concentration had decreased during 1979 and 1980 because of dilution from the flooding. The concentrations increased slightly at well (C-36-16)5L1-1 in the central part of the area and continued to decrease slightly at well (C-34-16)28dcc-2 in the northern part.

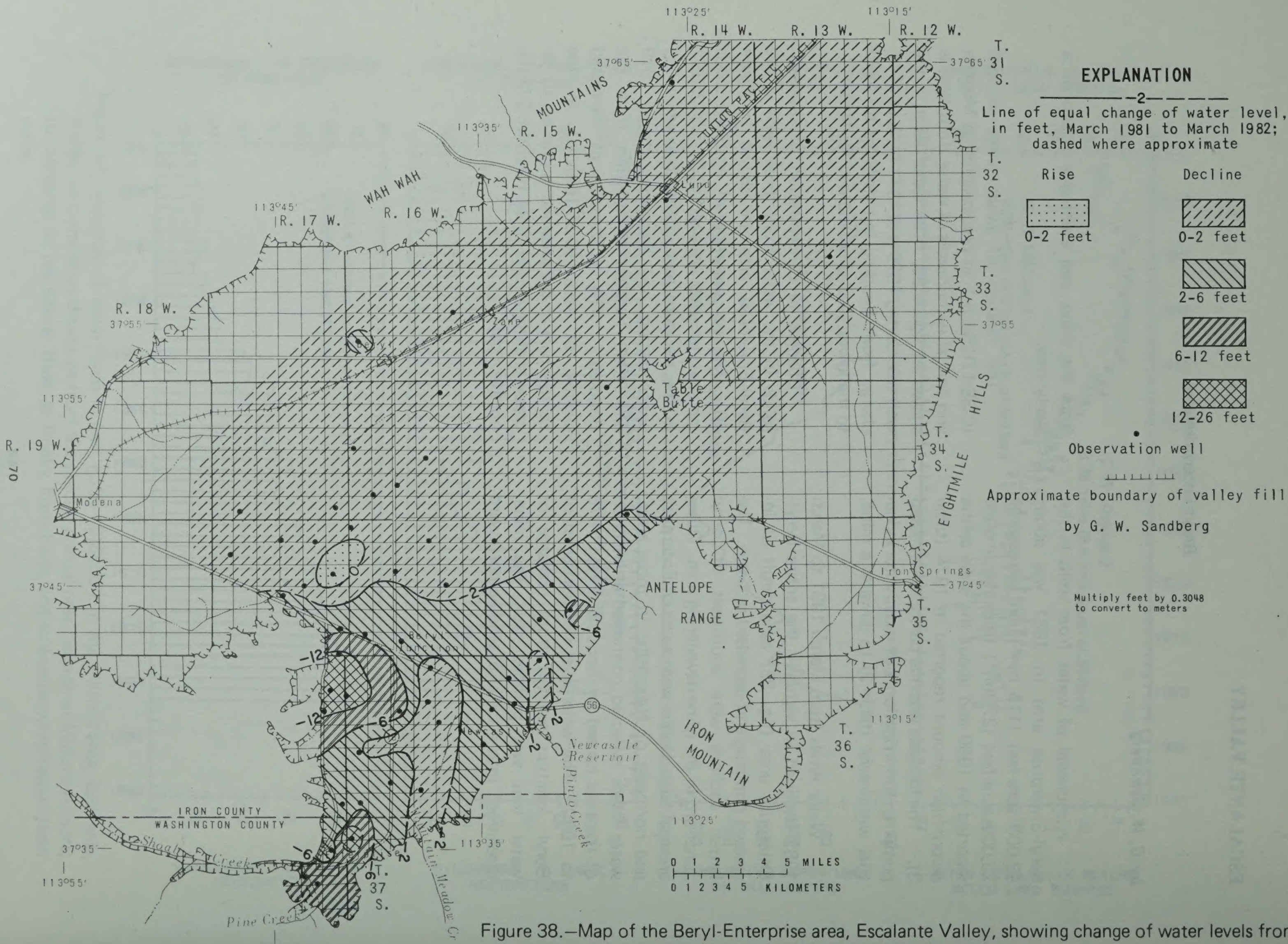


Figure 38.—Map of the Beryl-Enterprise area, Escalante Valley, showing change of water levels from March 1981 to March 1982.

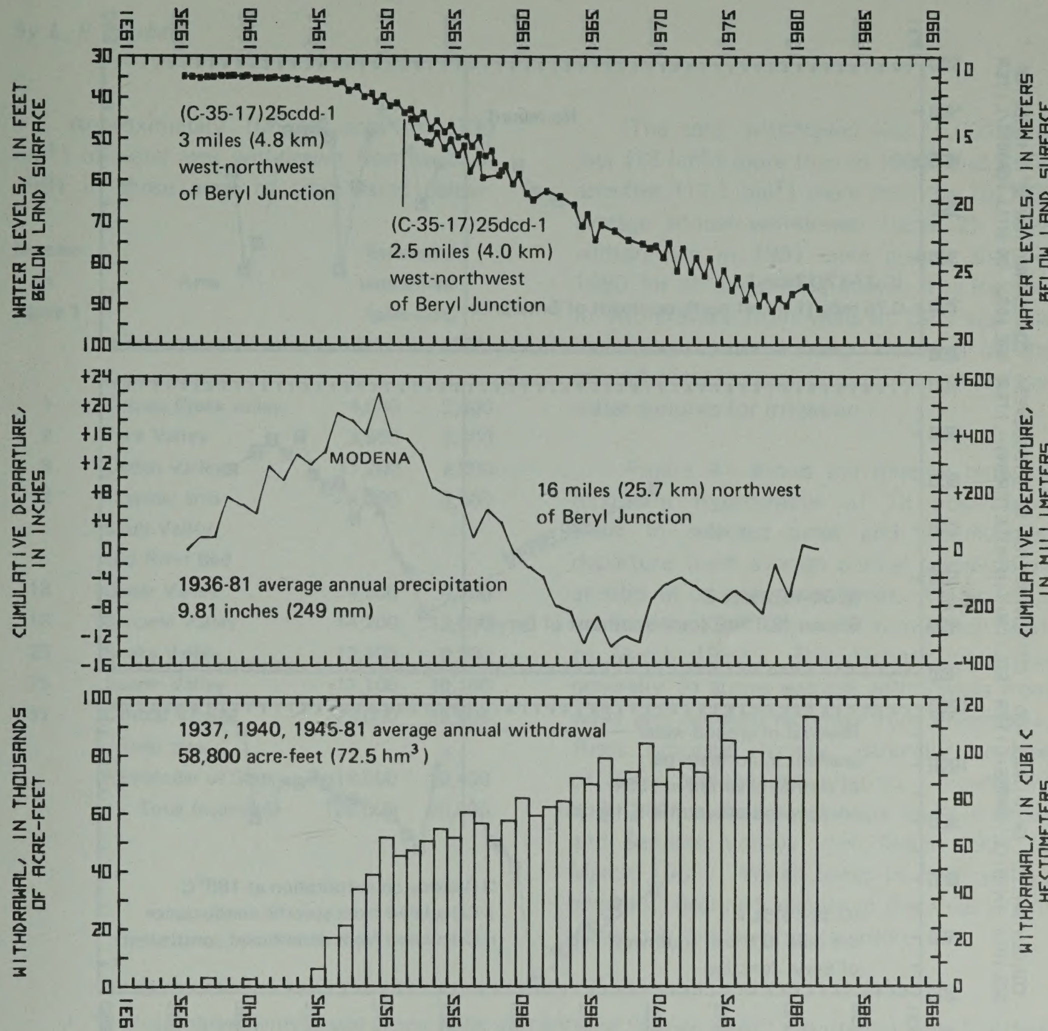


Figure 39.—Relation of water levels in well (C-35-17)25dcd-1 in the Beryl-Enterprise area, Escalante Valley, to cumulative departure from the average annual precipitation at Modena and to annual withdrawals from wells.

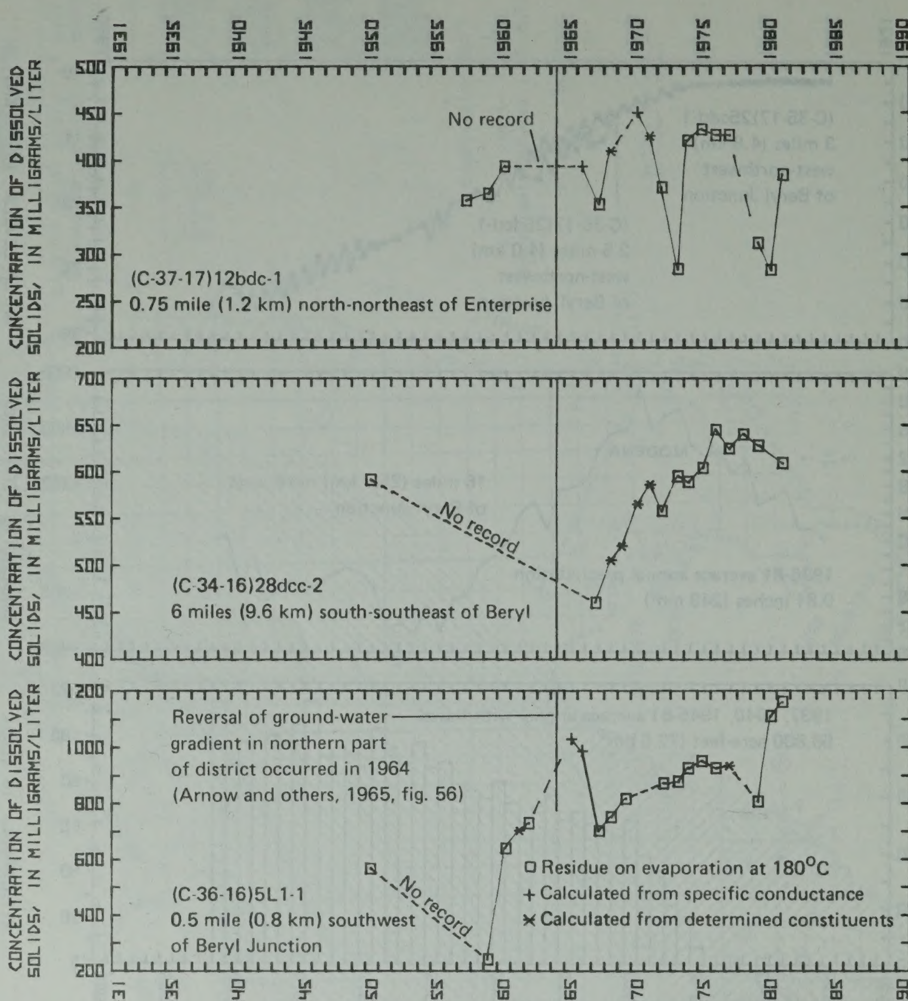


Figure 40.–Concentration of dissolved solids in water from selected wells in the Beryl-Enterprise area, Escalante Valley.

OTHER AREAS

by L. R. Herbert

Approximately 105,000 acre-feet (130 hm^3) of water was withdrawn from wells in 1981 in those areas of Utah listed below:

Number in figure 1	Area	Estimated withdrawal (acre-feet) 1981	1980
1	Grouse Creek valley	4,000	2,600
2	Park Valley	2,900	2,200
8	Ogden Valley	11,200	7,900
12	Dugway area Skull Valley Old River Bed	4,200	3,800
13	Cedar Valley	4,500	4,300
18	Sanpete Valley	14,200	12,600
23	Snake Valley	12,400	9,300
25	Beaver Valley	11,100	10,100
31	Central Virgin River area	22,000	19,000
	Remainder of State	18,500	18,400
	Total (rounded)	105,000	90,000

The total withdrawal was 15,000 acre-feet (18 hm^3) more than in 1980[1] and 9,000 acre-feet (11.1 hm^3) more than the 1971-80 average annual withdrawal (table 2). The withdrawals in 1981 were greater than in 1980 for all areas listed above. The increase in withdrawals from wells in 1981 was due mainly to continued large demands on the ground-water reservoirs to supplement surface-water supplies for irrigation.

Figure 41 shows the relation between long-term hydrographs of 18 observation wells in selected areas and cumulative departure from average annual precipitation at sites in or near those areas. Water levels declined in 13 of the wells from March 1981 to March 1982. The declines were due generally to above average withdrawals from wells and reduced recharge from streamflow. Rises occurred locally, generally because of above average precipitation. Figures 42 and 43 show changes of water levels in Cedar and Sanpete Valleys from March 1981 to March 1982. Water levels in both valleys generally declined, mainly in the areas where water is withdrawn for irrigation.

[1] The estimated withdrawal from wells in 1980 for "Other areas" reported in table 2 differs from the amount reported in 1981 (Herbert and others, 1981, p. 14). The difference is due to changes in areas reported under "Other areas" (see footnotes 13 and 14 in table 2).

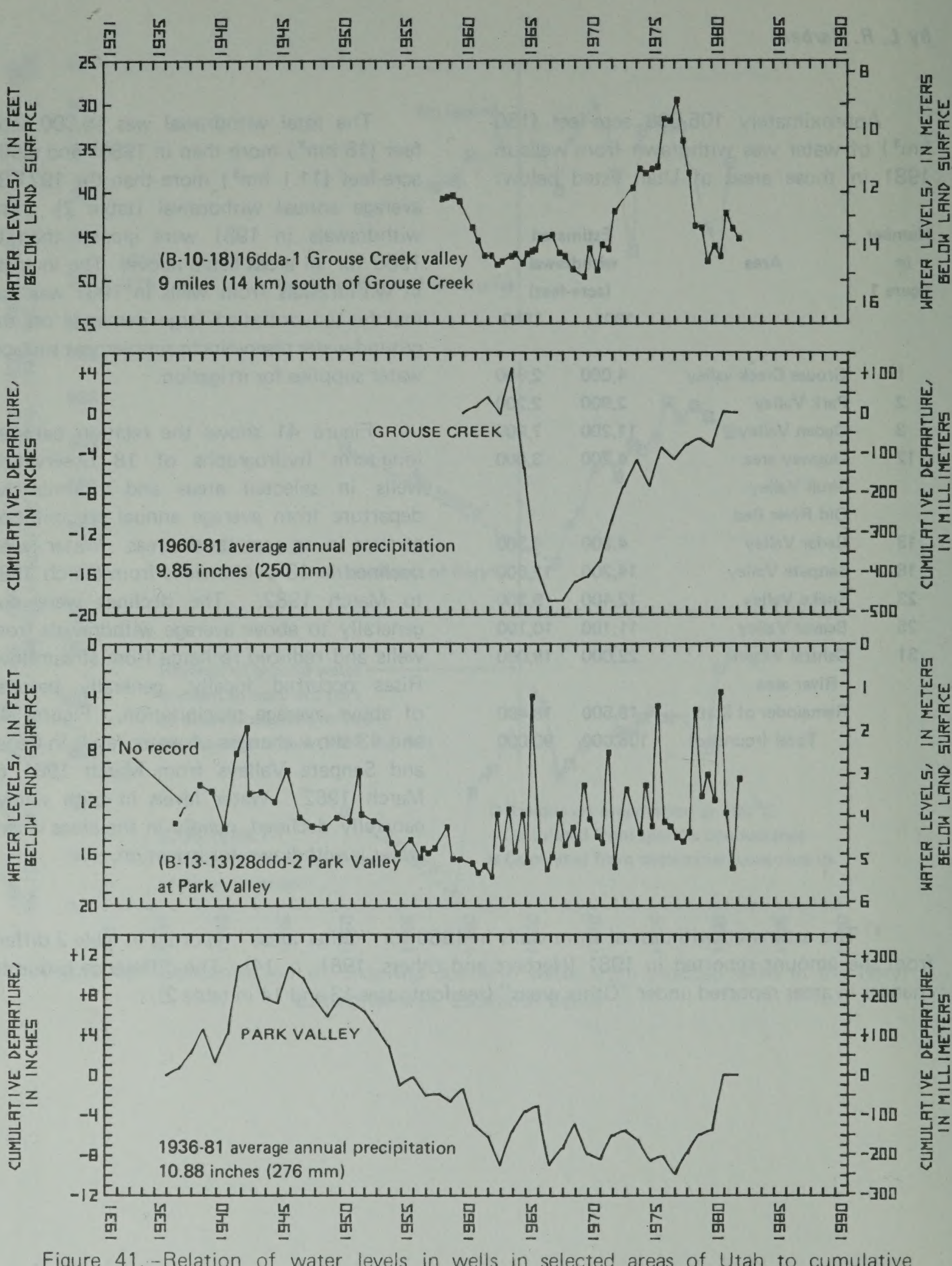


Figure 41.–Relation of water levels in wells in selected areas of Utah to cumulative departure from the average annual precipitation at sites in or near those areas, and also total withdrawals from wells in "Other areas".

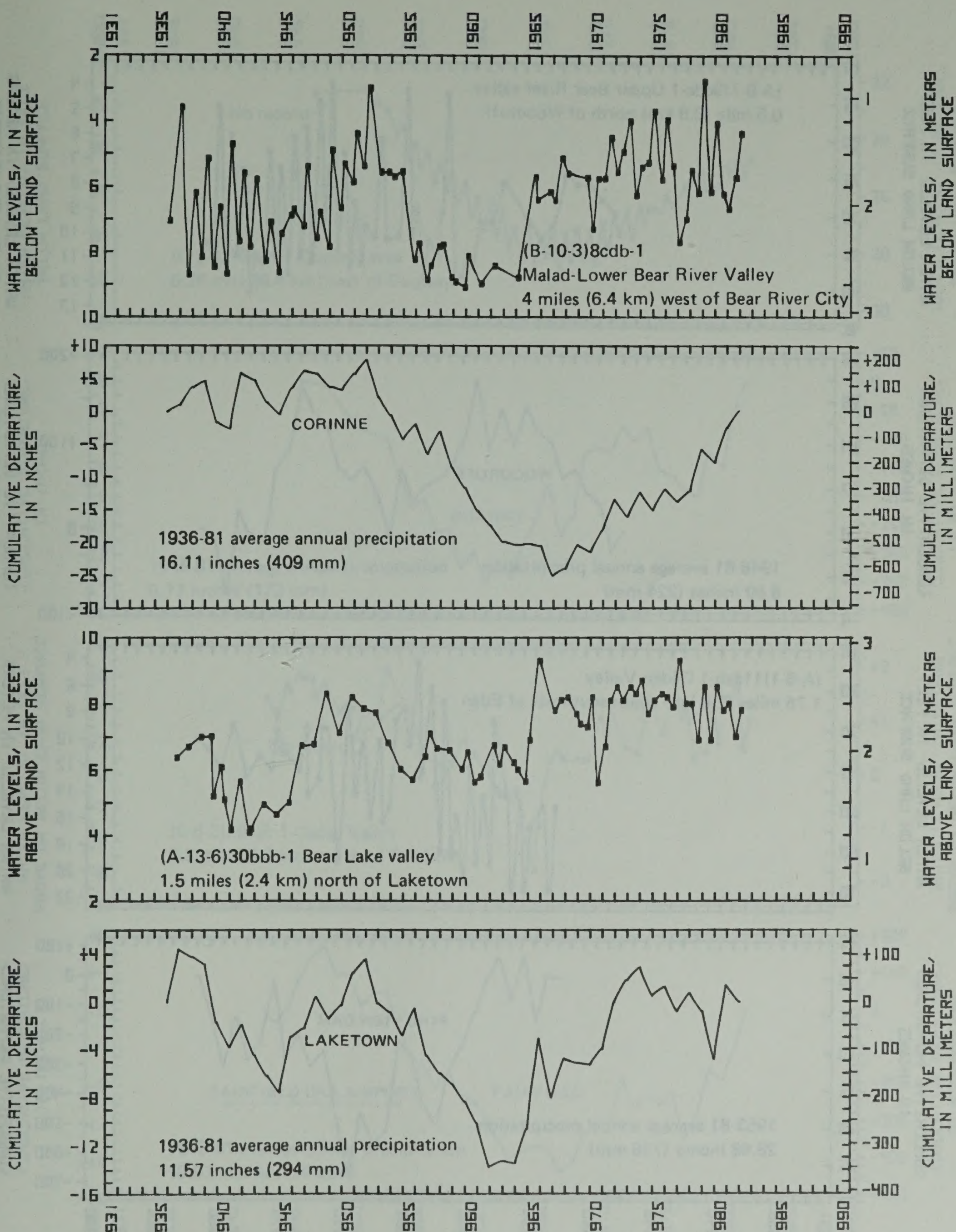


Figure 41.—Continued

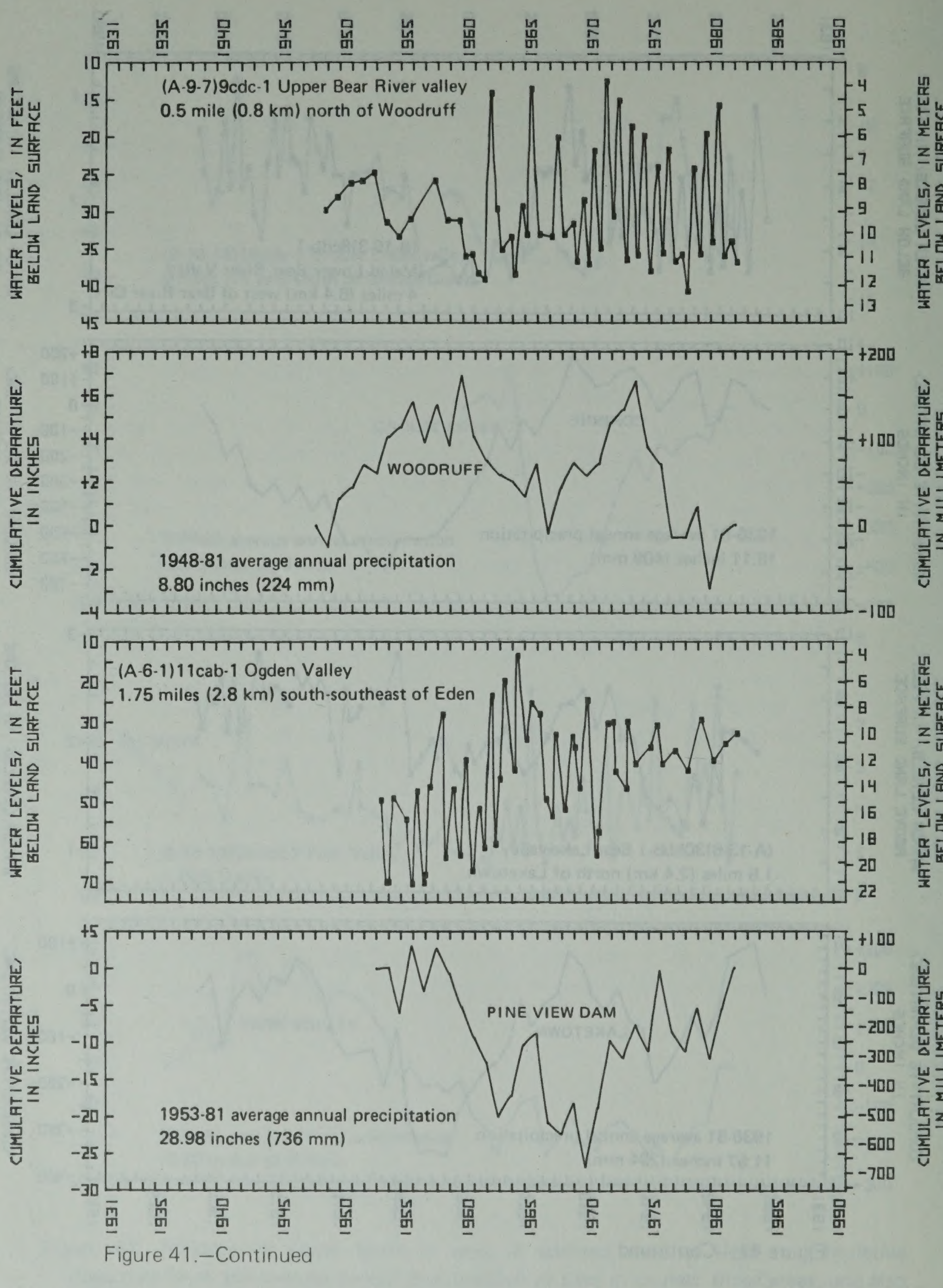


Figure 41.—Continued

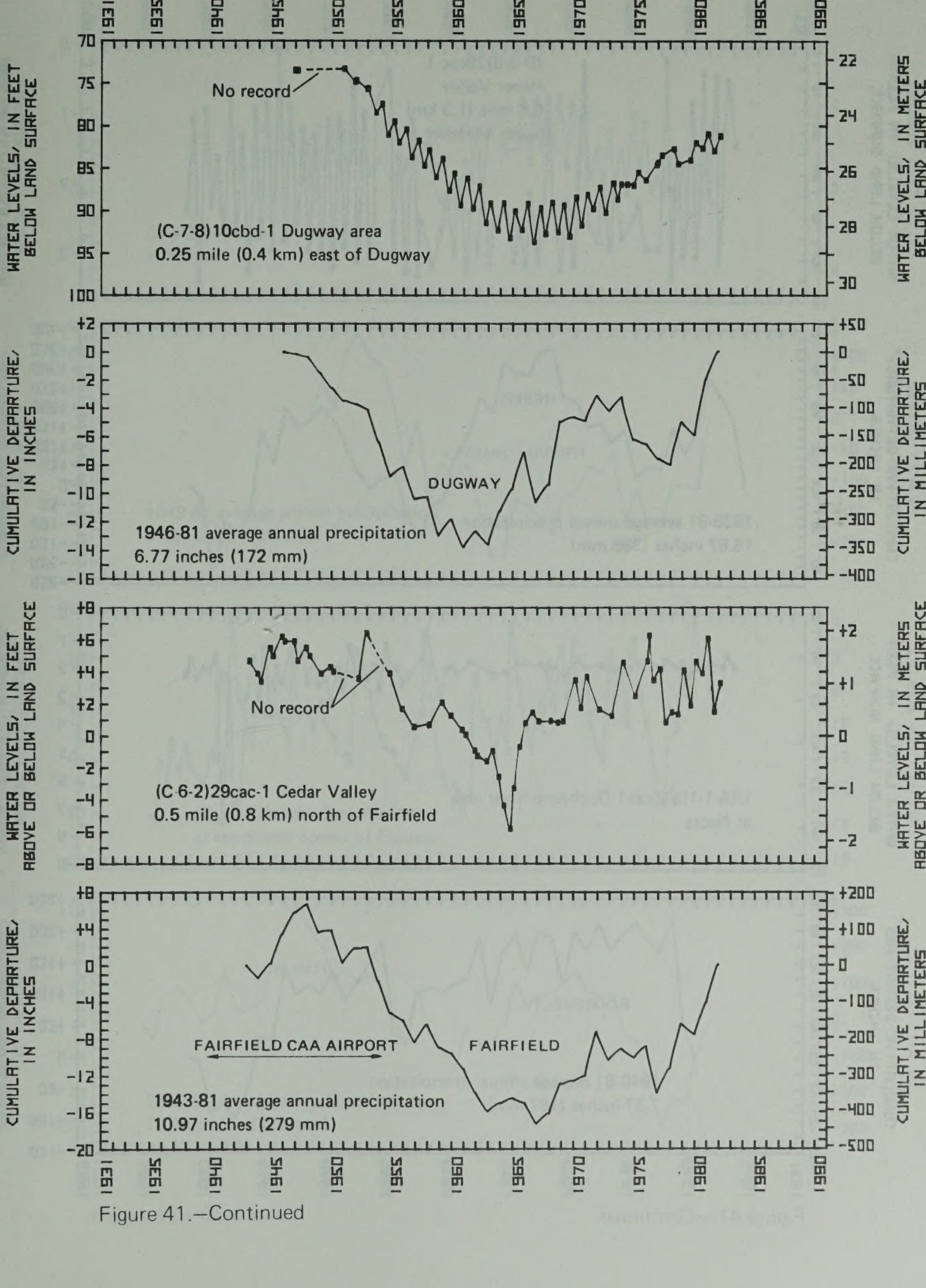


Figure 41.—Continued

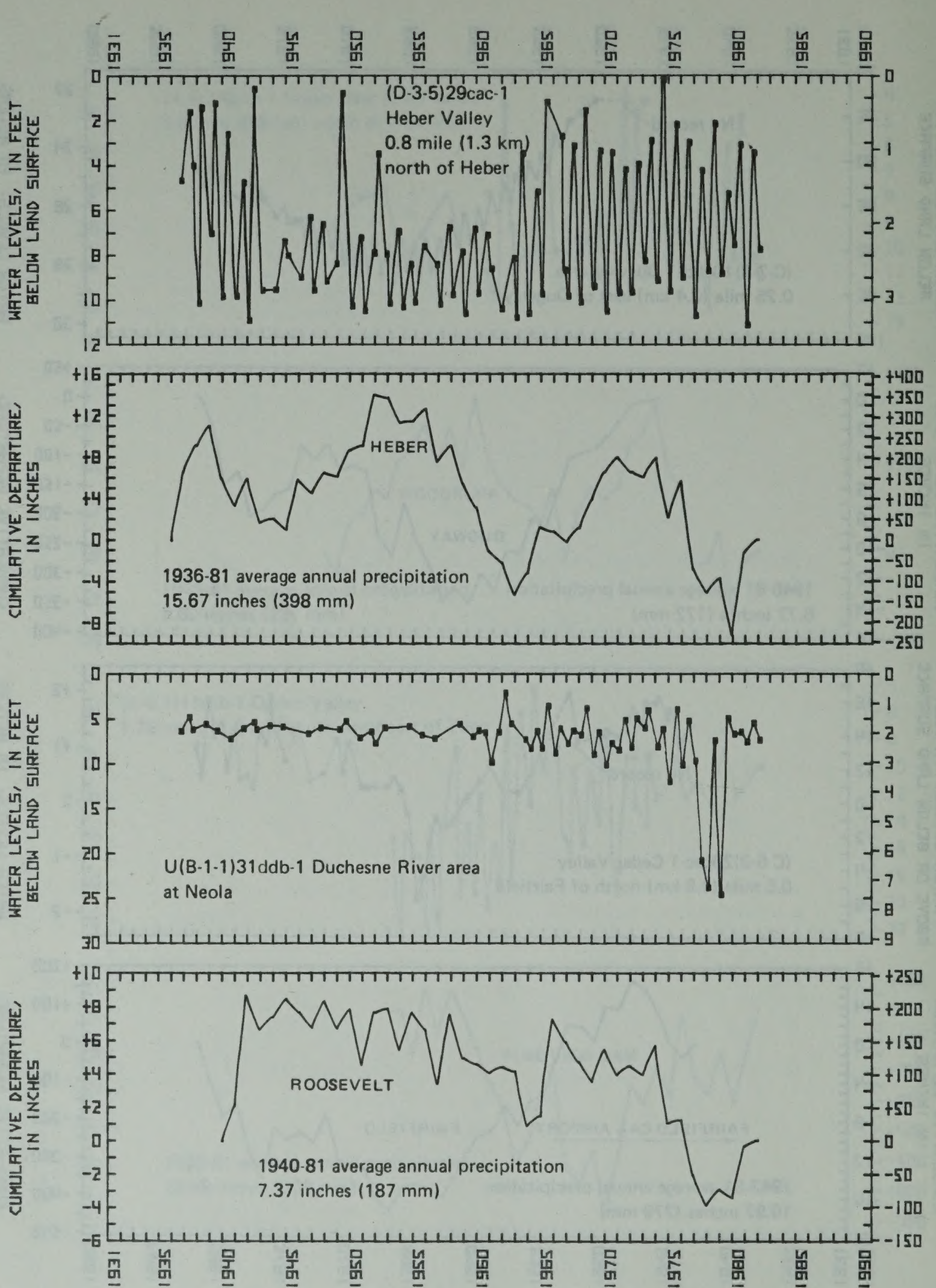


Figure 41.—Continued

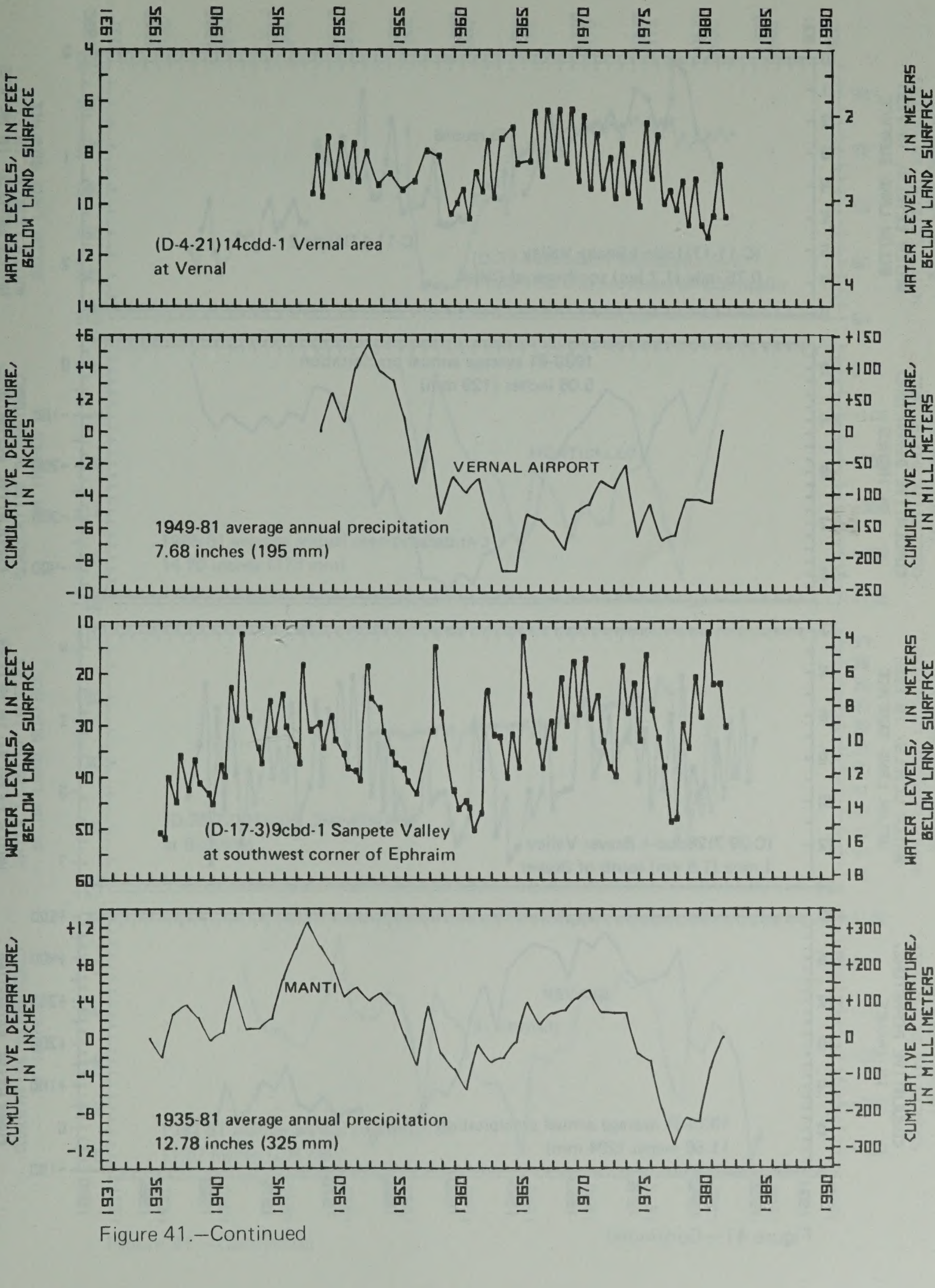


Figure 41.—Continued

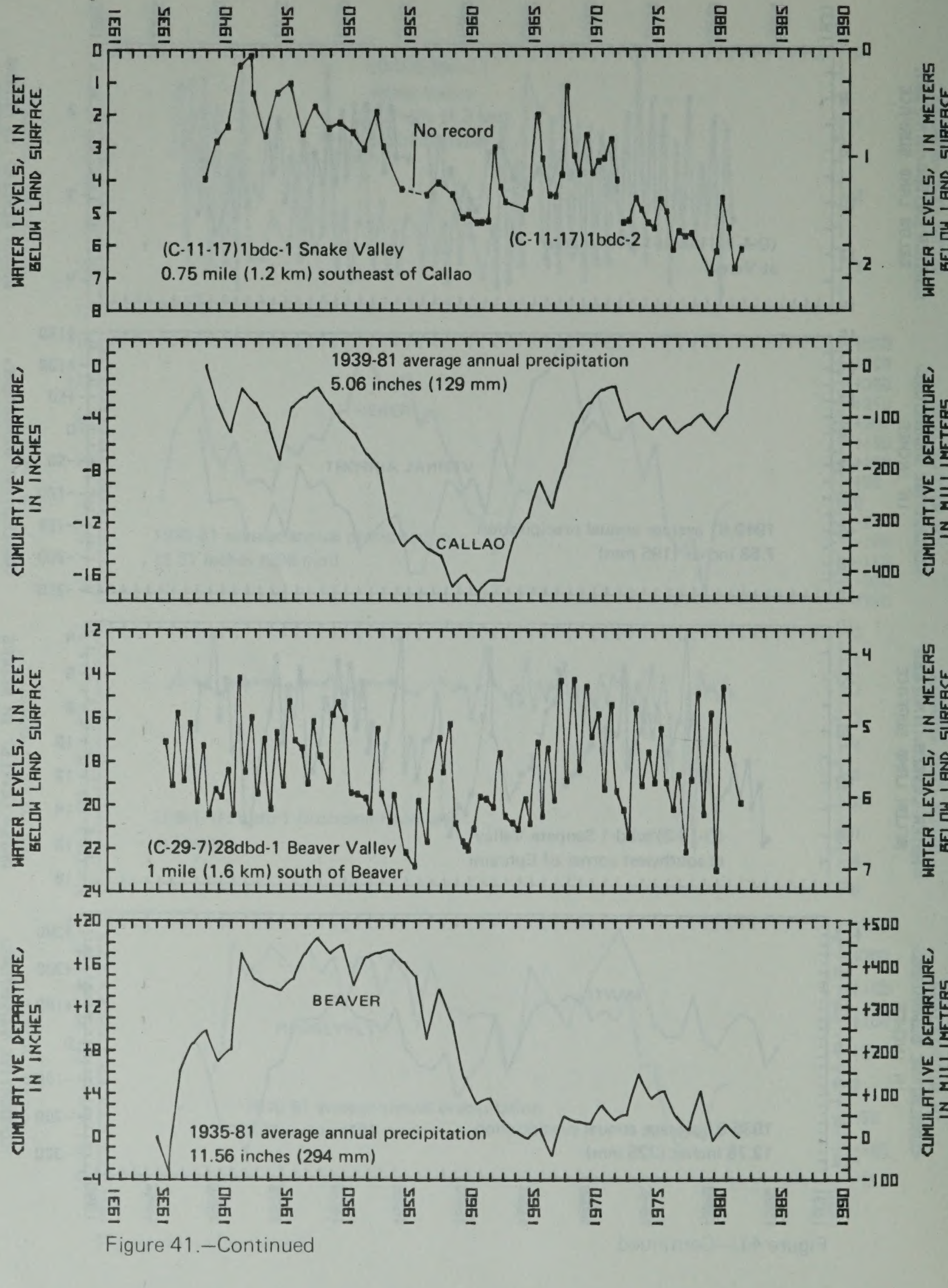


Figure 41.—Continued

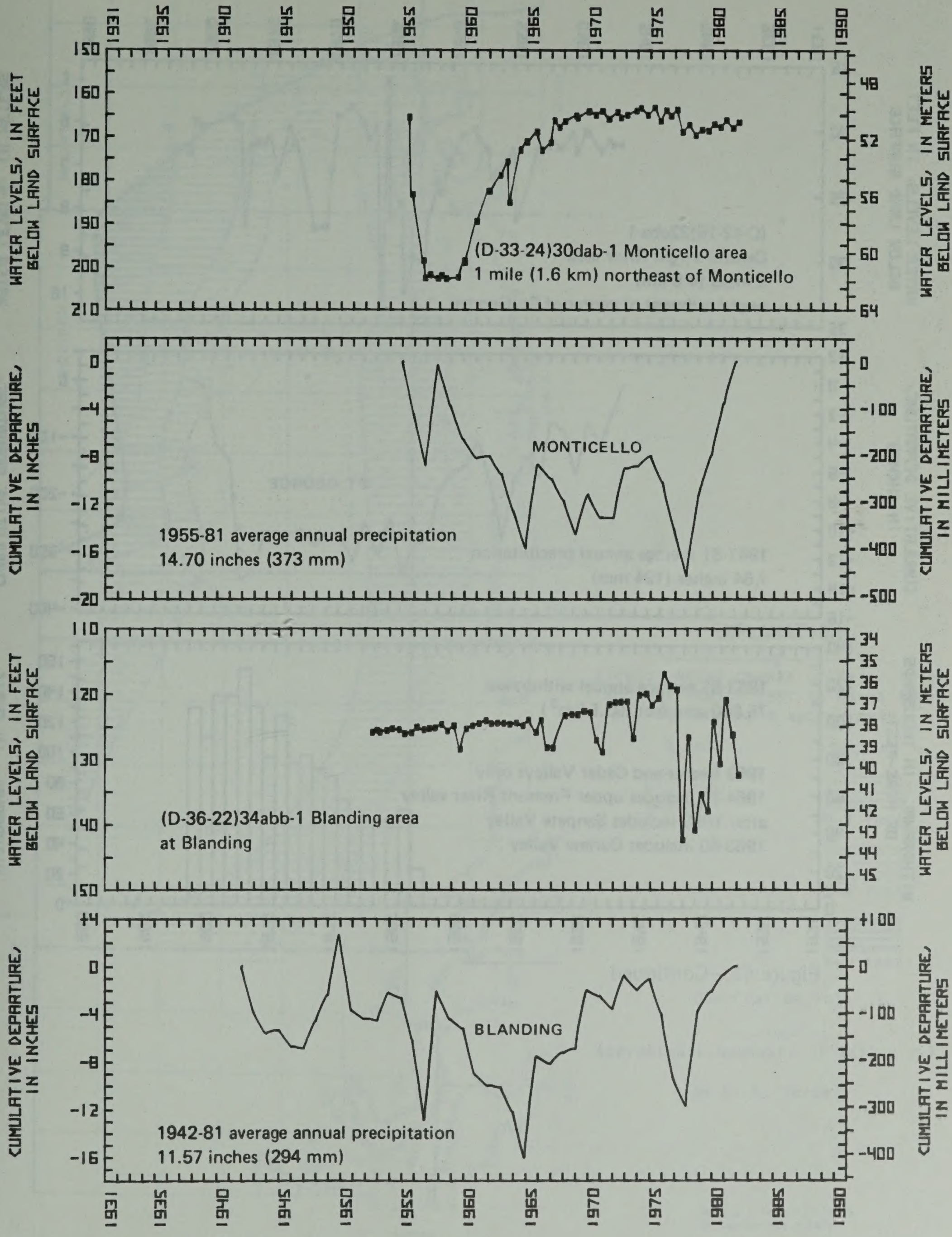


Figure 41.—Continued

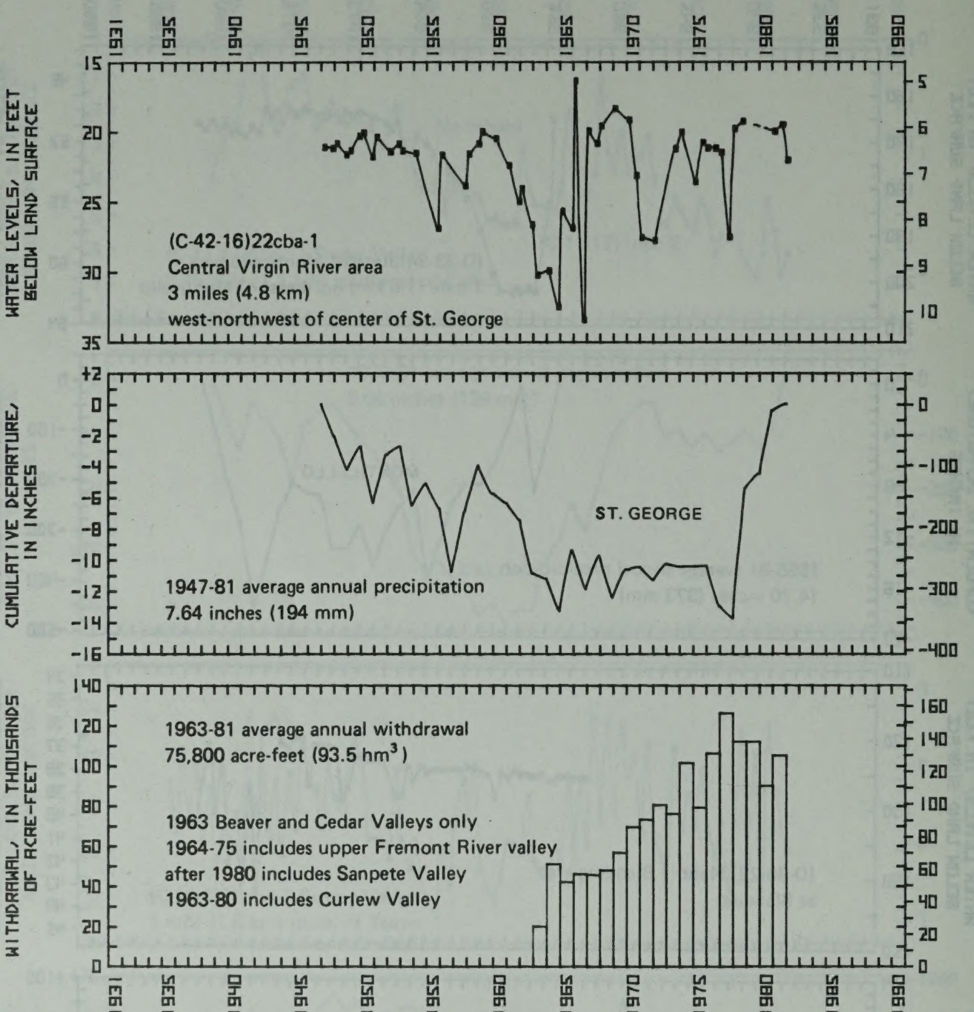


Figure 41.—Continued

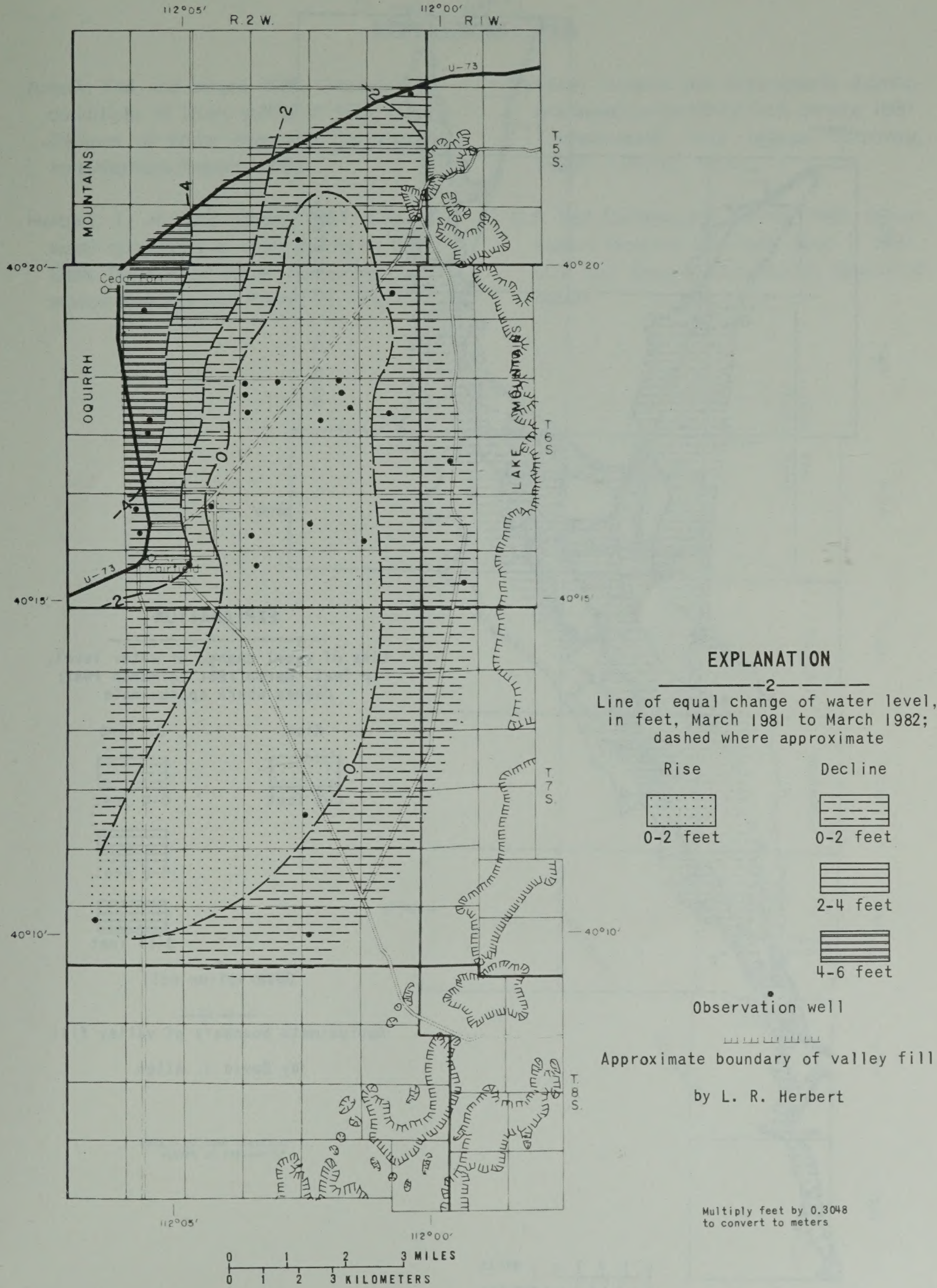


Figure 42.—Map of Cedar Valley showing change of water levels from March 1981 to March 1982.

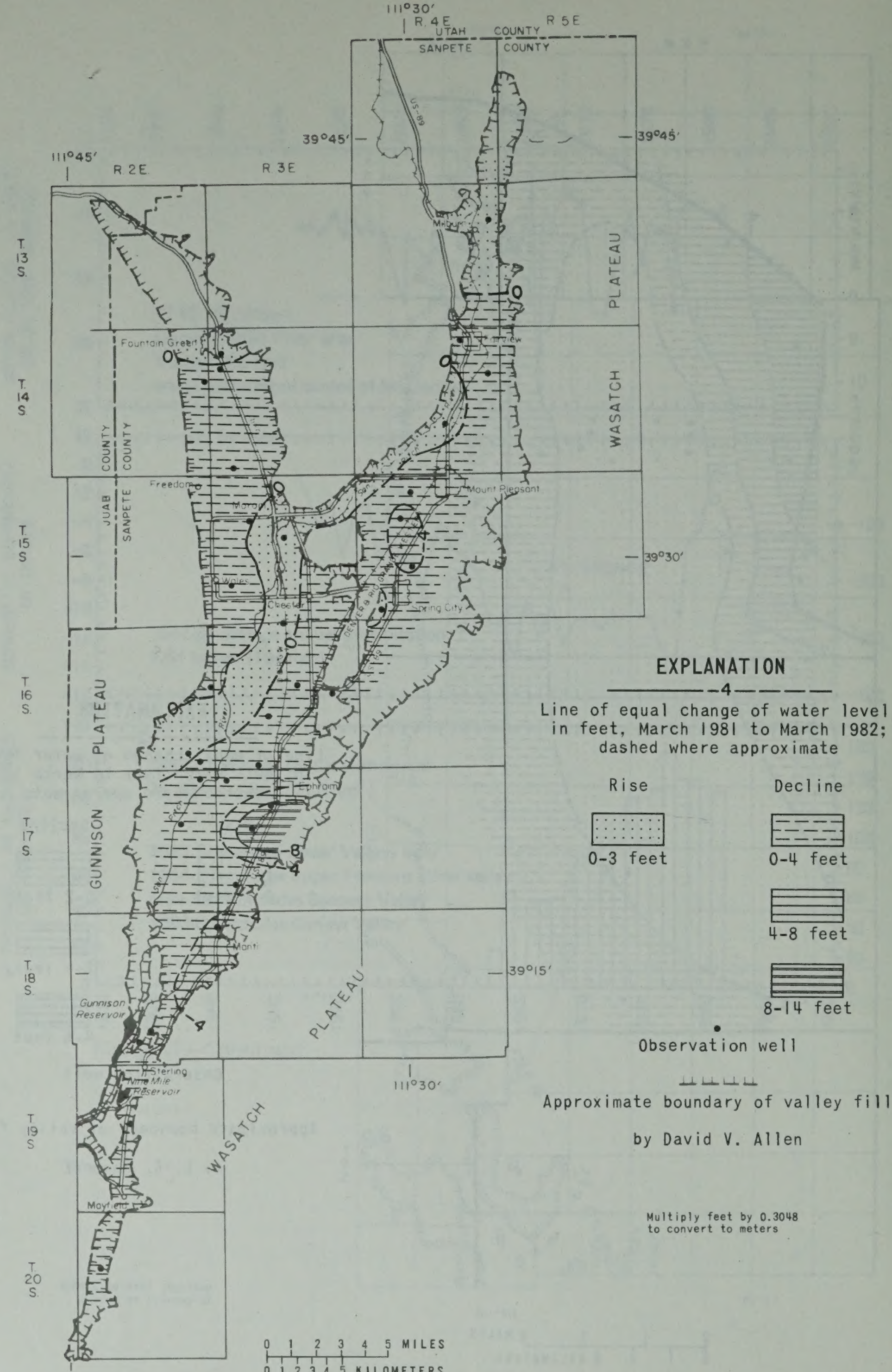


Figure 43.—Map of Sanpete Valley showing change of water levels from March 1981 to March 1982.

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